CANADIAN ARCHITECT AND BUILDER.

VOL. IX.—NO. 11. NOVEMBER, 1896 PRICE 20 CENTS $2.00 PER YEAR.

—THE—

CANADIAN ARCHITECT AND BUILDER,

A Monthly Journal of Modern Constructive Methods,

(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD).

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,

Confederation Life Building, - TORONTO, CANADA.

Telephone 2362.

Branch Office: NEW YORK LIFE INSURANCE BUILDING, MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.

The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

ADVERTISEMENTS.

Prices for advertisements sent promptly on application. Orders for advertisemnets should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of value to the persons in whose interest this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

TO ADVERTISERS.

For the benefit of Advertisers, a copy of this journal is mailed each week to persons mentioned in the CONTRACT RECORD reports as intending to build, with a request to consult our advertisement pages and write advertisers for material, machinery, etc.

A Point of Law.

IT may be a matter of some interest to our readers to know what legal rights are possessed by persons who may desire to move a building along the public streets from one situation to another. The Supreme Court of New Jersey expressed the opinion that the use of a public highway for such purpose was not within the rights enjoyable by the public in a public highway for the purpose of travel. The Supreme Court of Indiana decided that although citizens had the right to ordinary use of the streets they could not interrupt traffic or discommode the public by tearing down electric wires in order to remove buildings along the streets. In the case of the Toronto Street Railway Company vs. Dollery, it was held that a person cannot lawfully blockade the tracks of a railway company by moving a building.

Teaching of Architecture at McGill University.

WE have the pleasure to present in this number a personal sketch and portrait of Professor Capper, who has been chosen to fill the newly established Chair of Architecture at McGill University, Montreal. Professor Capper was honored by being called upon at the very outset of his career in McGill, to deliver the annual university lecture. It will unquestionably be gratifying to the profession throughout Canada to observe that the teaching of architecture has been given a place side by side with instruction in engineering and the other professions at the foremost seat of learning in the Dominion. A perusal of Professor Capper's address gives the impression that the new Department of Architecture has been entrusted to competent hands, and that at its head is a gentleman inspired by high ideals and a determination to impart as far as possible those ideals to his students and others with whom he may be brought in contact.

Proposed new Building By-Law for Montreal.

ALLUSION was made in our October number to the fact that up to that time the City Council of Montreal had taken no action with reference to the new building by-law which was drafted and submitted for their approval early in the year by the Province of Quebec Association of Architects. It is gratifying to learn that during the last month representatives of the Association were invited to join the aldermen in considering the matter. We have not learned what progress was achieved, but now that a beginning has been made in the direction of dealing with the subject, we trust that the necessary time will be given for its thorough consideration, and

that in the near future the Council will pass a by-law giving effect to the valuable recommendations made by the architects, which are the outcome of months of effort for the public welfare. We hope that the City Council of 1897 of Toronto, will also feel it to be their duty to either approve or reject the suggestions presented by the Ontario Association of Architects for the improvement of the existing by-law, which is admittedly defective in many important particulars.

Modern Toronto Architecture.

THE many large buildings which have been erected in Toronto within the last six or seven years, and those which are in process of erection at the present time, have given a metropolitan character to the city which it did not formerly possess. The appearance of most of these buildings, including the new City Buildings and the Foresters' Temple, now nearing completion, is satisfactory. It seems to us subject of regret, however, that the important structures last mentioned should have been situated in such close proximity to each other. Both would have gained in appearance had they been farther apart. The view of the new city buildings at present obtainable from Bay street is very meagre and unsatisfactory indeed, partly due to the towering structure at the north-west corner of Bay and Richmond streets, which has reached a height of eleven storeys. It would add very much to the appearance of both of these important buildings if the city should decide to expropriate sufficient land to enable Queen street to be widened opposite the new city buildings, thus removing a number of the dilapidated old structures which at present disfigure the locality and render it impossible to obtain a satisfactory distant view of the new buildings. The new city buildings are now sufficiently advanced to show that they will present, when completed, a character at once imposing, pleasing and refined in comparison with the American creation in Queen's Park. The statement has been published within the past few days that the Duke and Duchess of York will take part next year in the ceremonies attendant upon the formal opening of the building.

Fire Retardent and Light Diffusing Properties of Wired and Ribbed Glass.

BRIEF mention was made in our last number of recent tests which show the superior light diffusing qualities of ribbed as compared with plain glass. At the request of our readers we have obtained further information on the subject, for which we acknowledge our indebtedness to the Boston Manufacturers' Mutual Fire Insurance Co. The President of this company is Mr. Edward Atkinson, a well-known authority on methods of fire proofing. Mr. Atkinson's company recently arranged for a complete investigation of the subject at the Massachusetts Institute of Technology. From photometric comparisons made at this institution of the intensity of the light from two windows similarly situated, one glazed with plain glass and the other with ribbed glass, the light-diffusing properties of the latter were shown to be from fifty to two hundred per cent. greater than those of the former. While the general resultant direction of light entering through a window is downward, at an angle of 40 to 50 degrees, the action of the ribbed glass appears to be prismatic, the greater part of the light falling upon it at any point being refracted and spread out into a fan-shaped beam. The horizontal ribs tend to throw the light which would otherwise fall to the floor far into the room, while the vertical ribs spread out the light on both sides. The relative effectiveness of light is much greater where the light is derived indirectly than where it is derived directly from the sun. Heat appears to be diffused on the lines of the light, and while the same amount of heat may pass the ribbed glass that would pass through clear glass, it is so much better distributed as to give the effect of a cooler temperature. The fire retardent properties of wired glass have also undergone investigation by the same company, and the results obtained are both interesting and valuable. Glass of this description, heated to a red heat, so that a piece of paper held against it on the outside was easily ignited, was in this condition showered with cold water. The result was found to be that while the glass was cracked into countless pieces it still adhered together, forming one sheet. The following conclusions are drawn from the test: (1.) Wire glass can safely be used in skylight (on the main buildings of factories or works) and in such will withstand a severe fire and will not give way when water is thrown on it. A wooden framing for skylight, covered with tin, all seams lock-jointed and concealed nailed, is superior in fire-resisting quality to iron framing. (2.) Wire glass in wooden sash, covered with tin, all seams lock-jointed and concealed nailed, can be safely used for windows toward an external exposure. (3.) Wire glass can be safely used in fire doors to elevator shafts and stairway towers where it is necessary to light said shafts. (4.) In office buildings, hotels, etc., where it is undesirable to have elevator shafts entirely enclosed and dark, wire glass permanently built into brick or terra cotta shaft, or arranged in wood, metal covered frame can be safely used. (5.) Wire glass plates, securely fastened in standard fire shutters, can be safely used toward an external exposure. In this case the fact that a possible fire in a building, all windows of which are protected by fire shutters, can much more readily be detected from the outside through the wire glass, is of importance. We have previously referred to the manner in which buildings are destroyed as the result of the windows cracking and falling in, resulting in currents of air rushing in through the openings, either carrying flame into the building or fanning into life the fire slumbering within it. The use of wired glass, which would be less costly and much more sightly than iron shutters would tend to greatly lessen the danger of the destruction of buildings from this cause.

"MODERN METHODS" OF A "PROGRESSIVE ARCHITECT."

WE have from Hamilton the prospectus of one who calls himself a "progressive architect" doing business by "modern methods." The scheme laid bare of all the puffery with which he surrounds it is simply the issue of plans and specifications in connection with the mail order department of a departmental store. The prospectus contains cuts of several houses, of the merits of which, as there are no plans given, we are not able to form an exact opinion, but the offer frequently repeated throughout the prospectus—"this plan can be reversed free of charge if desired"—not only cannot be said to be consistent with good planning, but is truly unprofessional. The architect is, like the doctor or lawyer, a professional adviser; that is to say, the client comes to him as the repository of special knowledge, and out of his knowledge he advises the client for the client's interest. This progressive architect, however, appears to

ated the School of Science as being an institution of about the same status as many of these men.

The era of "articled pupils" is no longer existant, and the meanness of the proprietors of almost numberless offices has brought about this state of affairs. I ask, is it just to a young man after he has attended public school, collegiate, and perhaps university, to enter an office as a pupil, when in reality he is an office drudge?—who, by the way, is not free to break his part of the agreement as soon as he finds the principal has no time to teach him anything. He must "pick up" as best he can a knowledge of the business out of office hours, as he is kept at specifications, tracing, etc., keeping office tidy, being there if any person happens to call when the proprietor is out. If office work is slack he may be allowed to copy a perspective drawing, which has already been published by the CANADIAN ARCHITECT AND BUILDER, during his office hours, and when his five years of such drudgery is over he may perhaps be given his railway fare to expatriate himself to the United States, or endure every obstacle possible being raised to prevent his starting an office in Ontario.

Sensible people now do not article their boys who intend to follow the profession of clergyman to a worthy divine, but they send him to school, and parents of would-be architects now do the same. I claim that in this school our architectural students acquire more knowledge in two years than they do in the average office in five years, and on leaving get good appointments in the States.

After calling the attention of your readers to the weak points in the scheme, allow me to suggest a few remedies:

1st. Let the Toronto University or the Hon. Minister of Education grant degrees for architects, which I would suggest be in the following order: A. Arch. (Associate in Architecture), for students; B. Arch. (Bachelor), for 3rd year students; M. Arch. (Master); D. Arch. (Doctor). Any person should be allowed to be examined, no matter from whence they came or wherefrom they obtained their knowledge, and a diploma should be given to all who can pass the prescribed examinations.

2nd. Make the owners of buildings, whether such are already built or in process of construction, responsible for damages to employees and other persons having business in the vicinity of such building at the time of total collapse or falling of any part thereof.

3rd. Avoid mentioning that people MUST EMPLOY an architect; the public think the Association of Architects want laws to prevent any person whatsoever from even building a shed in a yard or an addition to a barn unless an architect is to be called in and the inevitable 5% charged.

4th. If those architects who have not work enough to keep them and their assistants going all the year round choose to arrange to give instruction (provided they are capable of so doing) to their assistants, let such instruction be paid for by those receiving it; and on the other hand, when an assistant works for an architect his labor is of value, and should be paid for accordingly, either by piece work or by the hour. The best men are the busiest and have no time to teach boys.

5th. If the proprietor of a building is made responsible, and he has employed an architect to put up a safe structure, the proprietor should in turn be enabled to sue the architect for damages should an accident occur.

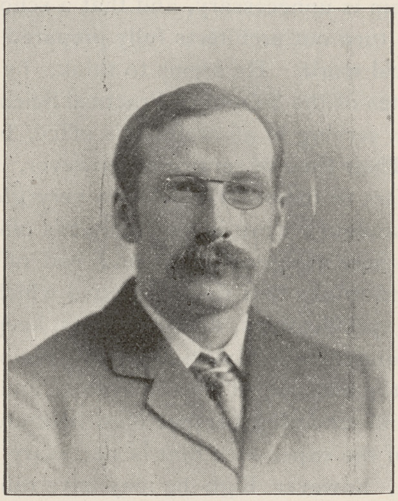
If the Association will modify the bill on these lines there is no doubt it will pass, and the public will soon judge for themselves the merits of different architects, and no doubt in time the recognized 5 per cent. will go, and less commission will be paid for work requiring but little skill, and more for that which does. Apologizing for taking so much of your valuable space,

S. JOHN IRELAND,
Principal Hamilton Art School.

PROF. S. H. CAPPER.

IT affords us much pleasure to be able to present to the readers of the CANADIAN ARCHITECT AND BUILDER the accompanying portrait of the first Professor of Architecture at McGill University, Mr. Stewart Henbest Capper, M.A. (Edin.), A.R.I.B.A.

Professor Capper, who is 36 years of age, and consequently at the zenith of his powers, was educated at the Royal High School at Edinburgh. In 1875 he entered the University of Edinburgh, graduating in 1880 as Master of Arts, with first-class honors in the Department of Classical Literature and being awarded the Pitt Club scholarship in Classics. From 1879 to 1884 he



PROF. S. H. CAPPER.

acted as private tutor and also as private secretary in the household of the British Plenipotentiary at Lisbon and Madrid, and took advantage of the opportunity to study the architecture of Spain and Portugal. From 1884 to 1887 he studied and travelled in France and Italy, being admitted by examination a student of the Ecole des Beaux Arts, Paris. From 1887 to 1891 he practiced as an architect in Edinburgh, and during this period erected a number of important buildings. In 1891 he was elected an associate member of the Royal Institute of British Architects, and shortly afterwards was admitted a university extension lecturer in connection with Edinburgh University. He has given numerous courses of lectures upon Architecture, both historical and technical, in Edinburgh, Perth and Dundee. In 1896 Mr. Capper was appointed examiner in the Faculty of Arts at Edinburgh University for the department of archæology and art history.

We have had the privilege of seeing copies of the testimonials presented by Prof. Capper to the governors of McGill University. They bear the signatures of men of the highest educational attainments in the universities and professional societies of Great Britain, France and Spain, and leave little room to doubt the qualifications of the gentleman who has been chosen to instruct the rising generation of Canadian architects. The architectural students of the future are to be congratulated upon the fact that the means of obtaining a thorough architectural training are now available within the boundaries of their own country.

THE ONTARIO ARCHITECTS' ACT.

In another column will be found a letter from Mr. S. John Ireland, principal of the Hamilton Art School, in which he upholds the idea of exacting a standard of education from architects, but objects to the amendment to the Ontario Architects' Act, by which it has been proposed to effect this end in Ontario.

The intention of the proposed amendment is, briefly : To allow all architects who are at present making their living as architects to continue to call themselves so, but to prohibit after a certain date anyone from beginning to call himself an architect without having undergone a certain process of education. And the education of the future architect is to be accomplished by preparation for a series of examinations, either in private or by attending the School of Practical Science or another training school, and by serving a certain length of time in an architect's office in order to acquire an acquaintance with the practical work of architecture.

Mr. Ireland's contention is chiefly that this period of apprenticeship is unnecessary, and that a school such as his own can turn out architects fully prepared to enter upon practical work. He seems to think, by the way, that graduates of the School of Practical Science are exempted from serving in an architect's office, but this is an error. Their time of service is, however, shortened from five years to three. He draws a very gloomy picture of the student's work in an architect's office, and it is true that there are good offices and bad offices ; but if Mr. Ireland thinks that time is wasted which is concerned with specifications, drawing plans, keeping office files and arrangements in working order, seeing persons who call in the absence of the architect, and even in setting up and rendering perspectives, he knows little of the nature of the experience that is necessary before a young man, however high he may have ranked at an art school, is fit to undertake the practical work of the business responsibilities connected with putting up a building. The legislature is concerned with the rights of the public as much as with those of the student (if indeed the right of a student to balk his own education is at all one of those rights for which legislators have consideration), and we fancy it will not see its way, in the case of any bill which is brought before it, to abolishing the enactment that students shall serve some time in the office of a practising architect.

Mr. Ireland seems also to think that the legislature should abolish what he calls the "self-dubbed architect," but how to do this is a difficulty. The "self-dubbed architect" is simply the existing architect, and to abolish him would be to abolish vested interests. It is not the doing of anyone interested in the bill, but of the tradition of English legislation that "as the bill was framed the present self-dubbed architects are to be architects still." To take every occasion of alluding to them as "self-dubbed" is therefore unkind of Mr. Ireland ; but to go further and allude to them as a "ring" which would try to keep out younger and better trained men, or to allow himself to conceive the idea that an architect would dismiss his student with the gift of his fare to the United States in order to get him out of the country, or to suppose that students would have to "endure" the raising of obstacles to prevent their starting an office in Ontario, is to imagine a lowness of mind in the members of an artistic profession which we should not have expected to find attributed to them by the principal of an art school. It is worth noticing in this connection that the objection which has been raised in England to making the title "Architect" obtainable only by examination is not that existing practitioners will repress younger men, but that the profession will be flooded by young men because it will have risen in dignity. So with many men there are many minds. But it is about details. The main idea that architects should be properly qualified for what they profess, and that the title "Architect" should be assumed only as a degree, representing the attainment of a certain standard of education and training, is coming to be a matter of general agreement, and Mr. Ireland appears to be prepared to approve of legislation, which would properly attain this end.

In the latter part of his letter Mr. Ireland gives some items of advice to intending legislators or promoters of legislation. Article 3, to "avoid mentioning that people must employ an architect," emphasizes what is, we fear, a very common misapprehension. There are no doubt many persons who think that an attempt is being made to make it impossible to build a shed without the intervention of an architect and what Mr. Ireland calls "the inevitable 5 per cent." It seems also that some builders think they will no more be free to build from their own plans, but that at the first sign of building some monopolist architect will be down upon them and place his veto on the work until he is called in—and gets his fee. It is no wonder that legislators who approve of the measure themselves are nevertheless timid about being associated with it. As a matter of fact, neither the Act nor the amendment do or could declare that an architect must be employed for anything. It is the architect himself upon whom it is proposed that the law should lay its hands and say what he must do ; that if he wants to profess architecture he must give evidence that he is qualified to produce sound architecture. That is the whole story, and if anyone can extract from such a proposal anything but benefit to the public, or any direct benefit to the architect, or any indirect benefit to the architect which is not also a benefit to the public, he has a statement to make that has never been made before ; for any objections that have been raised hitherto have been founded either upon mere anxiety or upon misapprehension of what is proposed.

In simple truth, the Act is intended to benefit—not the architect, but architecture. But the architect believes that everything which raises his art will make his own life better worth living. Therefore he favors it.

PUBLICATIONS.

William Paul Gerhard, C. E., Consulting Sanitary Engineer, is the author of a book entitled, "Theatre Fires and Panics—their Cause and Prevention," the first edition of which has just been published by John Wiley & Sons, New York. Price $1.50.

We have received from the publisher, Mr. Wm. T. Comstock, 23 Warren street, New York, a copy of his Directory of Architects of the United States and Canada for the year 1896-97. An examination of the book shows the list of Canadian architects to be so full of errors, as to be of little value. The price of the directory is $1.00.

The cutting in half of the ordinary rate for weekly papers by the Montreal Weekly Gazette has been attended by a large increase in circulation, which the publishers expect to see still further expanded during the coming season. The Weekly Gazette gives all the news and interests all classes who take an intelligent interest in public affairs and the development of Canada's resources. At fifty cents a year it is the cheapest of the metropolitan weeklies, and it is good. It is published by the Gazette Printing Company, Richard White Managing Director, Montreal, to whom correspondence and orders should be addressed.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

DEFECTIVE PLUMBING.

"Property," a real estate paper published in this city, recently printed the following :—"Two cases have just been reported to us which prove the folly of getting a cheap plumber, who will turn out a job that is always unsatisfactory and sooner or later leads to further expense. In repairing the closet in a house in this city the workman happened to strike the ventilator in the ceiling with his head. It fell down with such a slight knock that the man looked at the hole and found that the ventilator was a dummy one, not going beyond the plastering of the ceiling, and of course it was not of the slightest use. In the other case, one of our leading plumbers was called in to examine some tenements where the tenants complained of bad smells and leaks. On examination he found that the soil pipes were made of galvanized iron and had naturally been rusted into holes, allowing both gas and water to escape. The whole of the houses had to be done over again, entailing double expense and a lot of trouble. Moral: Get your plumbing done by a reliable firm."

SAFETY OF FLOORS.

The City Building Inspector reports as the result of his investigations into the cause of the collapse of the building in this city in which the recent fatal fire occurred, that the falling of the upper floor was due to overloading with merchandise. The floor was so far overloaded that the additional weight imposed by the water thrown into the building by the firemen caused the supporting beams to bend and give way. The practice of loading floors of warehouses with merchandise to an unlimited extent, and without taking the precaution to enquire what load they were originally designed to bear, is far too common in all cities. The means for the prevention of accidents from this cause are provided in the draft building by-law prepared by the Province of Quebec Association of Architects, and now under consideration by the City Council, as follows :—

"The floors in all buildings hereafter erected, or floors in existing buildings which may be renewed, shall be so constructed as to carry safely the weight to which the proposed weight of the building will subject them, but the least capacity per superficial square foot exclusive of materials in floor, shall be as follows : For floors of dwellings, 70 pounds; floors of offices, 100 pounds; for places of public assembly and schools, 125; warehouses, stores, factories and buildings for other commercial purposes, 150 and upwards, according to the use for which they are intended.

"In all warehouses, storehouses, factories, workshops and stores, where heavy materials are kept or stored or machinery introduced, the weight which each floor will safely sustain upon each superficial foot thereof shall within 90 days after the passage of this act be estimated by a competent person employed by the owner or occupant.

"But if the inspector shall have cause to doubt the correctness of said estimate, he is empowered to revise and correct the same, and for the purpose of such revision he and the assistant inspectors may enter any building and remove so much of any floor or other portion thereof as may be required to make necessary measurements and examination.

"When the correct estimate of the weight the floors in any such building will safely sustain is ascertained as herein provided, the inspector shall approve the same, and thereupon the owner or occupant of said building, or any portion thereof, shall post a copy of said approved estimate in a conspicuous place on each story of the building to which it relates."

ARTS AND MANUFACTURES.

The classes in connection with the Council of Arts and Manufactures were opened a few weeks ago. The instruction is as in former years. A great number of pupils were enrolled. Mr. L. A. Boivin occupied the chair. The classes are held from 7.30 to 9.30 p.m., and are entirely free of charge. The greatest enthusiasm prevailed and everything points to a very successful season's work.

ST. JEAN BAPTISTE SOCIETY CLASSES.

The course of public lectures delivered under the auspices of the St. Jean Baptiste Society are well attended. A large number of persons have attended these lectures, and those who have not should not fail to do so in the future. It is a good way to obtain knowledge in different branches of art and science. The lectures are entirely free, the sum of $2,500 being granted every year by the Quebec Government towards the expenses. On the opening night Mr. Justice Loranger, who occupied the chair, explained that the object the society had in view was to educate the laboring classes, and that the lectures were approved by the Council of Arts and Manufactures as well as by the Council of Public Instruction. In presenting the address of welcome to Premier Flynn, the president made allusion to the advantage it would be to have a museum of mineralogy, and asked the assistance of the Province for this object. Mr. Flynn, in replying, wished the society all the success they deserve to achieve in their undertaking. The names of the different classes have already been given in the ARCHITECT AND BUILDER, the only change being that Mr. Boivin, instructor in Applied Science, has tendered his resignation on account of illness, and has been replaced by Mr. E. Lafontaine.

PERSONAL.

Mr. F. W. Guernsey, C. E., of Stratford, was recently married to Miss Rose Sharp, of that city.

Mr. Edward C. Linden, a well-known contractor of Hamilton, Ont., died at the hospital in that city last month. Deceased was 39 years of age.

Mrs. C. H. Wheeler, wife of the well-known architect of Winnipeg, died in that city on the 18th of October. Mr. Wheeler has the sympathy of many friends in his bereavement.

Mr. George Clapperton, superintendent of the Bennett & Wright Co., Toronto, was presented by the employees with a beautiful tea service, on the occasion of his recent marriage.

The friends of Mr. Alan Macdougall, C. E., will be pleased to learn that his health has been greatly benefitted by his recent stay in Great Britain. He expects to return to Toronto at the first of the new year. Mr. Macdougall was appointed to assist in making arrangements in Europe for the visit to Toronto next year of the British Association for the Advancement of Science.

Mr. Thomas Fuller, Chief Architect of the Public Works Department, Ottawa, was recently presented by the Governor-General with a souvenir, in the shape of a solid silver snuff box, the lid of which is a very finely executed bas relief of Christ blessing little children. The engraving on the lid is as follows: To Thomas Fuller, Esq., from H. E. the Earl of Aberdeen, as a small token of appreciation."

Sergt. Harp, who was one of the crack shots of this year's Wimbledon team, is a well-known Toronto contractor, having been in business in that city for ten years past. He has lately returned from Great Britain, where he won upwards of $500 in prizes, and has determined to try his fortune in British Columbia, for which province he took his departure a fortnight ago. Sergt. Harp established for himself in Toronto an excellent reputation as a contractor, and will no doubt succeed in his new field of effort.

The news of the sad death of Mr. John Day, architect, of Guelph, Ont., which occurred on the 5th inst., was learned with much regret. It is supposed that he met death by his own hands. For some years he had been suffering severely from the effects of a fall he sustained while superintending the erection of the Commercial Hotel at Guelph, and at times was quite morose. Mr. Day was the youngest son of the late Wm. Day, builder, and had a thorough knowledge of his profession.

BY THE WAY.

A Toronto hardware firm have had in stock for several years a pair of door hinges of decorative design, which, on account of their unusual size, they found themselves unable to dispose of. A month or two ago these hinges came under the notice of an architect who had a house in course of erection in a fashionable quarter, and who saw possibilities in effect which might be achieved by their use. The hardware merchant was glad to get rid of the unsaleable articles at less than half the price he had originally put upon them. The architect designed a perfectly plain oak-veneered door, with a small opening filled with fancy glass in the upper part, and placed the hinges upon it. The effect is said to be decidedly unique as well as pleasing. By-the-bye, the builder was obliged to send this door to a piano factory to be veneered, owing to the unusual extent of surface.

× × × ×

"Your remarks, recently, anent the injury likely to result to the reputation of the furnace manufacturer who permits work of installation to be imperfectly carried out, were undoubtedly correct," said a manufacturer in this line to me the other day. "The speculative builder used to come to us and specify a furnace far too small for the requirements, with piping and other adjuncts in proportion—his object being to sell the house as soon as possible. Formerly we were accustomed to sell what was asked for, believing that as we were to have no part in the putting in of the system, no responsibility could attach to us for its proper working. Latterly we have come to view the matter differently. When we came to consider that the occupant of a house which is thus inadequately equipped for heating, notes only the fact that the furnace bears the name of a certain manufacturer, and attributes all his discomfort to a defective heater, we were not long in concluding that our good name was in danger. Now, when a builder comes to purchase a furnace from us, we insist upon knowing all about the house in which it is to be placed, and we will refuse to sell a No. 4 furnace to do the work of a No. 10."

ILLUSTRATIONS.

NORMAL SCHOOL, HAMILTON, ONT.—WILLIAM AND WALTER STEWART, ARCHITECTS.

DIOCESAN THEOLOGICAL COLLEGE, MONTREAL, QUE.—A. T. TAYLOR, F.R.I.B.A., ARCHITECT.

HOUSE, LAVAL AVENUE, MONTREAL, FOR MRS. JOSEPH LEVY.—VIEW OF HALL IN SAME.—J. & H. C. NELSON, ARCHITECTS.

The material is red and buff sandstone and pressed brick, with red tiles on front gable and upper storey of tower. The interior finish will be chiefly of whitewood. Owing to the nature of the soil the footings of all walls are composed of concrete and light steel girders.

Note.—In the description accompanying the illustrations of proposed bridge across the St. Lawrence river at Montreal, which recently appeared in these pages, mention should have been made of the name of Mr. Walter Shanley, consulting engineer for the Montreal Bridge Co. and referee for the award of prizes—also Mr. C. N. Armstrong, managing director of the company.

TRUE FACTOR OF SAFETY.

The employment of the so-called factors of safety implies corresponding degrees of inexactness of our knowledge of the precise static or dynamic value of the resistances of structural materials, details and workmanship. The degree and kind of this inexactness varies, says the Contract Journal, according to the nature and purpose of the structure in question to which the factor is applied. The factor for a live or dynamic load is usually assumed to be double that for a dead or static load. When the load consists partly of static and partly of dynamic effect, the live load may be converted into the assumed equivalent dead load, and added to the dead load portion of the estimate. The factor of safety has generally reference to a fraction of the ultimate breaking or destructive strength of the materials. This gives rise to a large numerical factor. Hence there has been a tendency by the inexperienced to curtail the fractional value of the factor of safety to a rather hazardous extent. This is especially so when applied to materials and workmanship, as well as design, which are of an inferior character. The destructive strength of materials is often a very valuable ratio (say two or three times) of the crippling strength, and is still larger in excess of the elastic limit of the materials. The elastic limit, however, has likewise a somewhat variable and uncertain value with different testers, and the precision of different testing machines is not alike in degree or manner of registering the limiting point. But neither series of values, of the destructive or crippling strengths, or the elastic limit, has any constant relation the one to the other alike in all materials nor in all samples of the same materials. In good present practice the elastic limit is assumed as the basis of the factor of safety, because it is the nearest approach to the serviceable strength of all structural materials for all practical purposes, and involves the minimum of uncertainty. The factor is therefore correspondingly reduced to a half or a third of the elastic limit, according to the complexity of parts. The adaptability of the design and details, and of the character of the workmanship and materials in the several parts and positions, to the purposes of the structure must be considered. Permanence under exposure to weather or injury from other causes, or from variable or accidental loading, etc., must likewise be kept before the mind.

MORTAR OF BRICK DUST.

It will not be without interest, says the Moniteur de la Ceramique, in a recent issue, to make a note of the application of brick dust for the making of mortar. Why not, indeed, use this substance, if it is good, and even economical in certain cases, as a substitute for cement? Experiments have been made with a mixture of this substance with quicklime, and blocks made of such composition, thirteen millimetres thick, after having remained submerged in water for four months, have sustained, it appears, without cracking or breaking, a weight of 10,500 kilograms per square decimetre. One part in ten of the brick dust was sufficient to give ordinary mortars a remarkable cohesive power. This composition was serviceable for the construction of drains, reservoirs, cisterns, the tops of terraces, etc. The best proportion is one part of brick dust, one of lime, and two of sand, the whole mixed dry and wet with the water necessary.

"ARCHITECTURE IN THE UNIVERSITY."

UNDER the above title Prof. Capper, occupant of the recently established chair of Architecture, delivered on the 5th inst., the annual University Lecture to the students of McGill University, Montreal, as follows :

Architecture is a subject which, in the older universities of Europe, as distinguished from mere technical schools, has hitherto received but scanty recognition. At Oxford and Cambridge it has been represented but fitfully. The name of Prof. Willis, of Cambridge, will recur to many ; at Oxford also that of the Slade Professor of Art, John Ruskin. Both must ever be mentioned with honor. But the recognition of the subject has been solely on its theoretic and historical sides, that is, from the æsthetic and archæological standpoints. In no Scottish University is there a Chair of Architecture proper, though Edinburgh possesses a Professor of Fine Art, and Glasgow, by a curious antithesis, is endowed with a Chair of Naval Architecture. The more modern teaching bodies in England, King's College and University College, London, and in Liverpool—quite recently added to the list—the University College of the Victoria University, have al] Chairs of Architecture, both Theoretical and Practical. In France there are many local technical schools, and in the Ecole des Beaux Arts in Paris we have a great central school devoted to Architecture and its sister arts—rather would I venture to say its handmaid arts of Sculpture and Painting. But it is a so-called special school ; it forms no part of the famous University of Paris ; nor, so far as I know, is Architecture a university subject in Germany, Austria, Italy or Spain. In all these countries there are great technical and special schools, more or less on the model of Paris.

On this side of the Atlantic, on the other hand, in the United States, not only are there great technical schools, such as Massachusetts College of Technology at Boston, but we have a very frank University recognition of Architecture at Cornell, at Harvard also, at the University of Pennsylvania, and, above all, at Columbia College, New York.

In Canada we have at Toronto, forming part of the University, the School of Practical Science, in which Architecture is included.

To the list of those that embrace Architecture in their curricula, McGill University must now be added. The Chair has here been attached to the Faculty of Applied Science, which hitherto, with the exception of Practical Chemistry, has been wholly devoted to Engineering in its various branches. That there are peculiar advantages in this arrangement, I shall, I trust, have little difficulty in showing. I congratulate myself that Architecture is thus closely combined with Engineering, for, after all, of course engineering is for the most part but very specialized architecture, though, too often, it may be maintained, its somewhat unnatural offspring. And I venture too, by way of suggestion, to congratulate my engineering colleagues themselves, for, on the Scriptural principle that "a little leaven leaveneth the whole lump," I cannot but hope that ere long through them the salutary influence of Architecture may be felt, and may insensibly raise those engineering ideals, which, at present, with all their boasted scientific advance, have succeeded—can any one deny it? —in afflicting the world with some of the most gigantic monuments of ugliness that as yet man has ever achieved. (Laughter and applause.)

The peculiar dangers against which Faculties of Applied Science have to contend—and as such I unhesitatingly class the great Faculties of Medicine, of Law, and even of Theology itself —are that the true University standard of education for the whole man be lost sight of in the eager struggle and restless activity which characterize our modern conditions of society. In the struggle—I had almost said the scuffle—of existence, the student is naturally eager to equip himself with the utmost despatch for his work in life, that is, to shorten his probation, if by any means he may start the sooner in life's race. He is apt to view with impatience all subjects that lie outside his immediate path, and to devote himself exclusively to those by mastering which he may the more quickly gain his own livelihood and feel that he is advancing apace. Such "Brodstudien," as the Germans call them, the studies whose object is the mastery of the craft by which the student is to live, are specially technical, and form the basis of the technical schools, most admirable institutions, doing admirable work for the land, but still not universities. To grasp the distinction between the technical school and the university is of importance. Speaking generally, the essential difference between the two consists, it seems to me, in this: the technical school is equipped exclusively for and aims solely at imparting the knowledge that is requisite for a man's stock-in-trade, so to speak, as a handicraftsman in the labor of life. It does not seek to do more than fit the student for conducting on approved lines and with success the business of life—whether commercial, or manufacturlng, or professional. But the university aims at a higher standard of equipment and of life. Its ideal is more than a livelihood made, however successful. Its ideal is the man, quickened and developed in all the resources of his intellectual and moral being, with the avenues of knowledge opened out to him and harmoniously correlated, even though it is possible for the individual to take but one or other of these avenues for his own special walk in life. A University, if subdivided into Faculties, is yet more than any Faculty or group of Faculties ; it is more than all the Faculties combined, for it is the co-ordination of them all into one harmonious whole, evenly balanced and justly interwoven to make up the great, the inexhaustible, sum of human knowledge and human activity, both intellectual and moral. It is said that universities are unpractical ; that they do not fit a man for the practical business of life. It seems to me, on the contrary, that the university of to-day, properly equipped and working with modern methods on many lines, enriched by the inclusion in its curricula of all those subjects which modern life embraces and demands, is the only practical training ground for life in its fullest and noblest sense. To be educated is not to be unpractical, and with the vast increase of knowledge in almost innumerable branches that has crowded the intellectual life of modern times with rich stores undreamt of in bygone days, education is but piecemeal and stunted and one-sided that does not in the fullest measure seek to develop harmoniously the man in his entire life and being, that does not strive to widen the horizon of his knowledge, of his intelligence and of his sympathies, and that rests satisfied with an equipment, in itself it may be thorough, that is limited to the immediate needs of his own necessarily narrow calling. (Cheers).

Has Architecture then a right to a place in the university curriculum ? Can it vindicate its claim to the higher recognition implied by its admission amongst the subjects of university teaching ? Not only do I fearlessly claim for it that right, but I maintain that its inclusion in Applied Science is the surest way of maintaining unimpaired that true university standard of which I have spoken in the Faculty which is liable perhaps more than any other to be assimilated to the mere technical school. It is not the ideal of this Faculty—as has been scornfully or enviously suggested—to flood with the greatest possible number of the best drilled men the engineering profession in this country. The ideal of a Faculty of Applied Science in a great university is certainly to place at the disposal of those men whose bent is toward its particular subjects the highest training that modern science has to offer in those subjects, but at the same time to imbue them, as far as possible, with the broad catholicity of the university spirit, to widen their horizon with the university recognition of the unity of learning and the co-relationship of knowledge, in a word, to educate to the fullest the man, as well as to train the chemist, or the architect, or the engineer. (Applause.) And for such an ideal Architecture, I venture to affirm, with all deference to my colleagues, is of greater import than engineering. For what is Architecture ? and what is its relationship to Engineering and the Arts ? What, too, its relationship to the other Faculties ? What has Architecture in common with the studies that constitute their curricula ? Architecture is the science and art of building well. It is at once the most artistic of the sciences and the most scientific of the arts. It has been said—and no less a man than Mr. Ruskin has lent his great authority to the delusion—that the function of architecture is to ornament, that architecture is concerned with applying to a building ornament and features that in themselves are useless. No more monstrous fallacy was ever preached or swallowed wholesale by gullible humanity. Architecture is no such meretricious afterthought like the wooden Doric portico outside, which does duty for the Faculty of Arts. If it were so, the columns of the Parthenon would be hardly more respectable as art than the scalps with which the average Indian may have adorned his wigwam. Yet it is amazing how this inane idea has laid hold of men who should know better. It has met me already within the precincts of McGill (laughter); it has been held forth to me, in all seriousness, within the Applied Science building itself. (Renewed laughter).

Six thousand years ago—or more, it may be—on the edge of the desert, 150 feet above the Nile, there was raised the "most

enormous pile of building" ever reared by man. In it are combined "the finest masonry" and "the most accurate construction known." Many thousands of skilled workmen and an army of a hundred thousand unskilled laborers were employed, it is believed, in building it for twenty years. It is the sepulchral monument of a man whose name we know, but that is all. In all that colossal building, there is no shred of ornament, no vestige of enrichment of any sort; there is nothing "useless," unless it be the whole gigantic pile. For, indeed, it has tragically failed to insure a poor inviolability to the body of its founder. Yet, that the Pyramid of Khufu is architecture on the most majestic scale, no one, I think, will deny. I, for one, will gladly add that it is also engineering, magnificent engineering, of which for scientific accuracy we moderns might be justly proud.

Architecture does not consist in mere ornament or decoration. Art is not to be measured by its uselessness, but by its use; nay its vital necessity for the adequate expression of human intelligence and activity; were it otherwise, I would most willingly concede that, in the midst of such essentially living subjects as Mechanical and Civil and Electrical and Mining Engineering, not to mention Hydraulics—all of the greatest importance in the life of our modern complex communities—Architecture would but survive as an excrescence, an effete tradition, a cumberer of the ground, with a past indeed, but hopeless of a future. Art is neither so shallow a thing, nor yet is it a mystery, a hidden secret revealed to the few and to be swallowed, like a prescription, by the many. Art for the most part is common sense. It is experience touched with poetry. (Applause.) To Michael Angelo, the great Florentine sculptor, painter, architect, engineer and poet of the 16th century, we owe the significant sentence, "I know but one art." And our modern distinction between fine arts (by which we mean mostly painting and sculpture) industrial arts and mechanical arts and applied arts is wholly a fictitious one, unsubstantial and based on nothing at all in nature or in life around us. The most artistically gifted nation there has been of the Aryan stock is the ancient Greek, whose heyday lasted but a few brief centuries. But the Greeks—like Michael Angelo—knew but one art, and that was good art—and they called it TECHNE, "skill." In the Middle Ages, too, as in the heyday of arts in Greece, this unreal discrimination between art that is fine art and art that is some other art, did not exist. "There was only one art, and that true art," whether expressed in color, as painting, in form, as sculpture, in the total of a noble building, or in the commonest objects of daily use.

I crave your indulgence for enlarging upon this topic, which some may think well-worn and even threadbare; but the extraordinary notions that prevail upon art, the mysterious way in which it is spoken of as something apart, like some religious cult, not to be judged of or understood by ordinary folk, show how misunderstood it is. Art in architecture, as in everything else, consists in that fitness and adaptation to a purpose, that appropriateness in function, in form and expression which, I most sincerely believe, are not only inseparable from, but are the essence of, our appreciation of the beautiful.

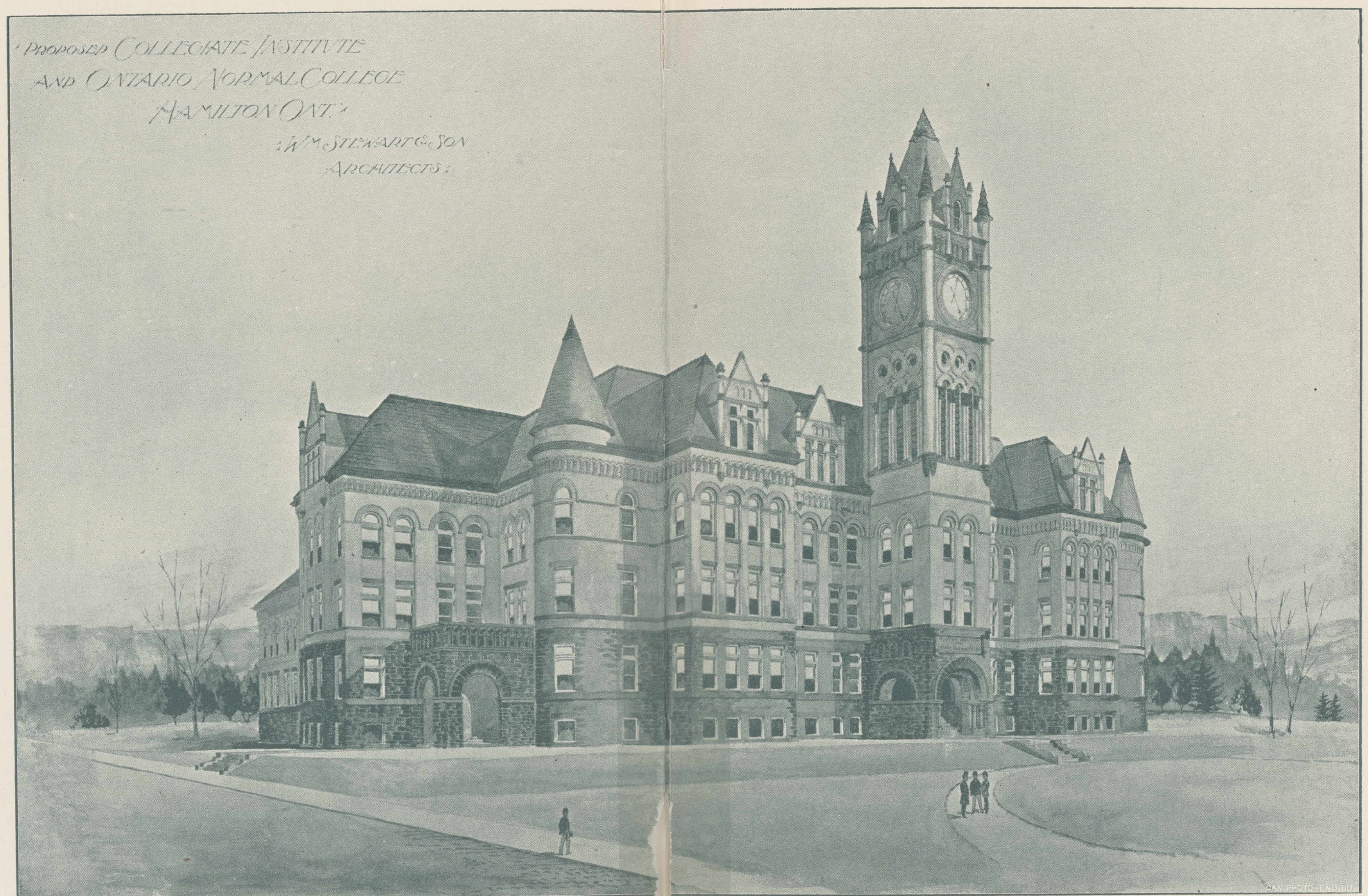
Take a modern racing yacht and compare it with a craft of olden days—the latter is picturesque enough in hull, with poop and forecastle, in its bellying sails falling naturally into curves that please the eye. But is the modern yacht one whit less beautiful? To me it is infinitely more lovely, yet every line of hull is calculated for a purpose—speed—and every sail is stretched to suit mechanical laws. The beauty—and I know no more graceful outcome of modern scientific design—is due to fitness and absolute appropriateness; it is most truly art. Take many a modern engine—the same holds good. Can anything more perfectly express and emphasize its function and its purpose than a modern, well-designed machine? And just in proportion to this successful expression is it beautiful and truly a thing of art.

"The designing of machinery,"—to quote a recent authority—"whether for peace or war, has now reached such a high standard of excellence in function, form and expression that one is justified in saying that these things are entitled to rank as works of art as much as a painting, a piece of sculpture, or a building, and also that machinery is the only true constructive art that has been produced since the decline of mediæval architecture. . . . Do not misunderstand me by thinking that I want to raise steam-hammers and pumps to the level of a painting or a piece of sculpture. All that I maintain is that they are true works of constructive art, and ought to be recognized as such. Moreover, in conjunction with the best art of former days, they teach this important lesson, that man cannot, unless warped by bad education and false criticism, construct anything except in a natural, functional, and therefore artistic manner."

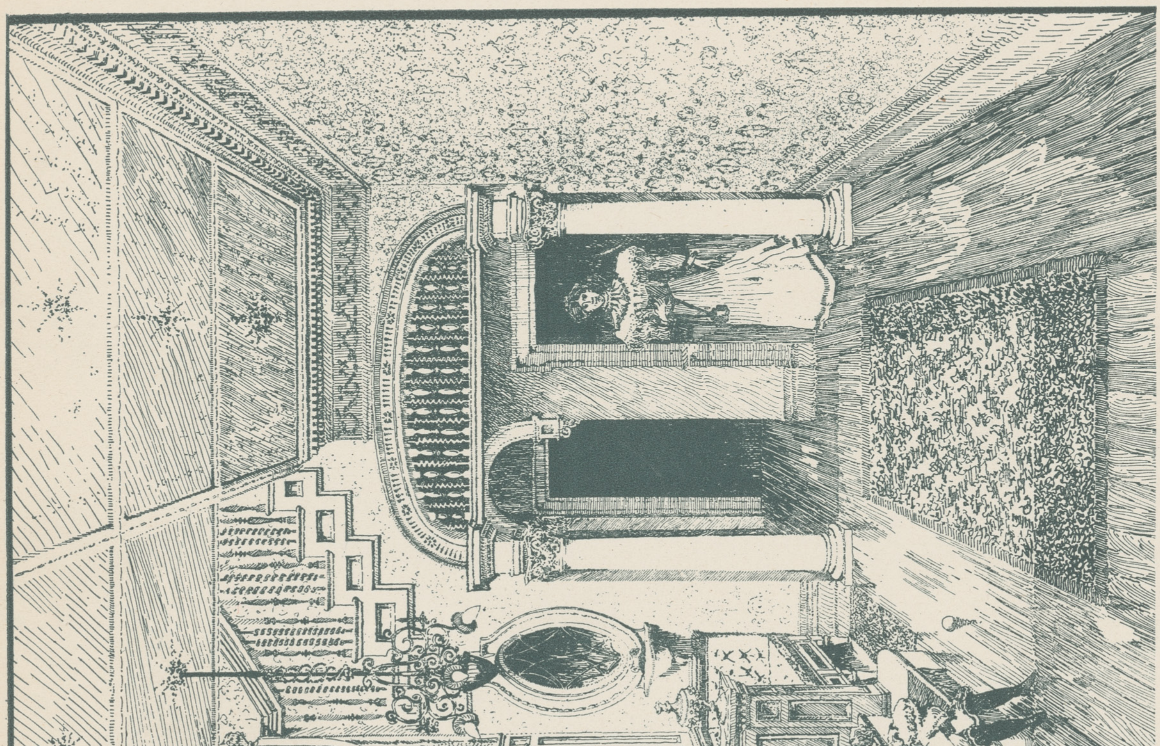
These sentences I have quoted are taken from a very admirable presidential address, delivered not by an engineer to engineers (as possibly you might suppose), but at an art congress in Edinburgh, by the most eminent of living Scottish architects. So, too, it is with architecture. Features that are mere excrescences cannot be really beautiful. A building that fulfills its purpose truthfully and well, that expresses faithfully its function in its form, will always be a satisfactory bit of architecture so far as outward design can go; while no amount of superficial ornament, however lavishly applied, can make a building really beautiful that fails in essential fitness to its purpose—that is inappropriate. Let me, however, not be misconstrued. Far be it from me to disparage ornament, when rightly used. It is against its false use, and, above all, against that total misconception that makes ornament all in all, exalting the accessory to be the essence, that I have been contending. Architecture may, as in the Pyramids, be majestic and sublime with never a trace of ornament; even ordinary building may depend solely for its effect on proportion and appropriateness, and be true art. But for the most part architecture craves for ampler expression, and in ornament, not applied from without but logically evolved from within, the outcome of the building in organic growth not added as an afterthought, we find the readiest and truest expression of the architect's design. The Parthenon is still an unrivalled monument of grace and dignity, though its sculptures for the most part are torn from it and scattered in museums. But it was when its true and noble architecture was completed with and wedded to its glorious ornament and sculpture, as one complete organic whole, that this most incomparable work of Grecian art was consummated. For Architecture does at least recognize that it should be beautiful. And herein, I venture to think, lies its superiority as a university subject to Engineering, in that it is more true to our wider human nature. Constructive engineering, as I judge of it, means, under present conditions, construction reduced to mathematics. It is building by calculation solely, with the result too often of a skeleton without the life. It is economy not only reduced to science but exalted for our worship; it is the apotheosis of utility. But man, in the long run, craves for what is permanently beautiful, while the modern engineer too often seems wilfully to make for what is ugly. Just as the German scientific writer of to-day apparently thinks that a lucid literary style is a pandering to what is popular, and therefore clothes his thought in those Teutonic periods so fearfully and wonderfully made—ingens, informe, cui lumen ademptum—so, too, the modern engineer seems to think that any attempt to make his structures beautiful is waste, a pandering to mere architectural effect, unworthy of scientific designing. Ultimately, I cannot but think, he will find that he is wrong; frail human nature, I believe, will rise in revolt against what is intolerably ugly; and I have too much faith in the engineering profession not to feel confidence that in the long run their great achievements will be brought to harmonize with this human need and will be beautiful without being one whit less scientific.

On the other hand Engineering scoffs at Architecture—and, I frankly admit, in many cases with much reason—for its faulty construction and its haphazard methods, not to speak of its frequent and most lamentable failures to be appropriate and beautiful. That Architecture ventures on criticizing Engineering I have possibly shown; that it fails to justify itself too often, that it is not beautiful, I must sorrowfully admit. Only in the due co-operation of these two great branches of construction, only by loyally accepting each other and working in harmony together, can we, I believe, achieve in these later days the best results. And it is with no ordinary feelings of satisfaction and hope that I enter upon the work of the teaching of Architecture in McGill University, where in the Faculty of Applied Science to a greater extent than in any other university with which I am acquainted, these two departments are knit together, working side by side, so as to acknowledge and appreciate and supplement each other. (Applause).

But the scope of Architecture is wider yet. Not only must it be scientific to be genuine and therefore allied to, nay, much indebted to, the accuracy, the refinement in calculation and the certainty of engineering; not only must it be artistic to be true, and therefore at once the foundation of all the arts and essentially an all-embracing art, if the term is to have real meaning; but it is a many-sided study—hydra-headed, the student is tempted to feel, when the examination-hall looms near—related to


PROPOSED COLLEGIATE INSTITUTE
AND ONTARIO NORMAL COLLEGE
HAMILTON ONT.
WM STEWART & SON
ARCHITECTS


Diocesan. Theological. College.
Montreal.
Andrew T. Taylor. F.R.I.B.A.
Architect.

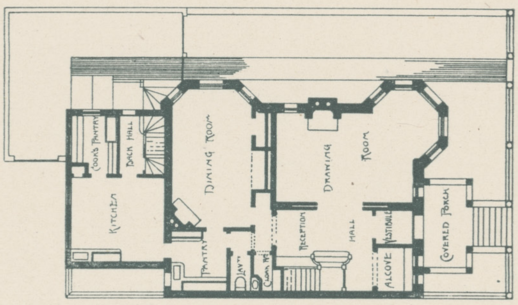


ENTRANCE HALL in

MRS. JOSEPH LEVY'S HOUSE on LAVAL AVENUE

JAS. H. C. NELSON ARCHITECTS

House for Mrs Joseph Levy
on Laval Ave: Montreal
J & H.C. Nelson Architects



Ground Floor Plan

life on many sides, and of a very special and intimate kinship with many—I might almost say with most—of the studies included in the university curricula.

Take, for example, Medicine and Law. In the former the great department of Hygiene is as much architectural as medical ; and rightly to understand this branch of science, so important to us all, individually and as communities, some knowledge of scientific planning and building, of sanitation and of plumbing, should be as necessary to the Bachelor of Medicine as is, without doubt, essential to the architect some acquaintance with bacteriology and germ theories, with the spread and prevention of disease. The two studies, apparently so far apart, have this much at least absolutely in common, and upon common ground like this, the unity of learning receives a very patent application.

So too in Law, where Professional Practice of the architect, Contracts and Arbitration, are the common ground, much as Medical Jurisprudence is common ground to Law and Medicine.

Even in Theology and Divinity again, it is obvious that we have common ground. It is not that I claim it necessary for an architect to be a theologian—heaven forbid ; but who can look back upon the grandest triumphs of Christian architecture, those glorious cathedrals, in which are enshrined the piety and devotion and zeal and faith of the middle ages, without feeling that the men who planned an l built those temples were in truest sympathy with the creed for which they built them. A little further back and the monk who worshipped in the Abbey church and the monk who built the Abbey church were brethren in the self-same cloister. And even in these modern days, when work is specialized, and students of architecture and theology have perforce their separate schools of study—both, it may be, apt to be too technical—that architect, it seems to me, cannot be of the highest sort who in studying a church is wholly indifferent to the forms of creed and worship of which he seeks to understand the outward shrine. (Applause.)

In the Faculty of Arts—that faculty to which all of us who have had the immense advantage of attending its courses (whether in this university or elsewhere) must ever look back with deepest gratitude and most loyal affection—gratitude for its broad, true education in the fullest sense, for its humanizing influence on all our after lives, for its catholic, vitalizing inspiration that does not pass away—affection for its serene disinterested ideals, which we fain would cling to through storm and stress of after years, yet cannot always keep before us as we would—in the Faculty of Arts there is scarcely a subject, I am thankful to claim, with which Architecture has not close and abiding kinship.

To Philosophy we turn in relationship of pupils to our teacher. Where else can we get the principles of logic, of induction and deduction, that must be employed in criticism? Where else the foundation for those principles of æsthetic sense and art, which it is ours to embody in creating logical, harmonious design?

To Architecture, as to Engineering, Science is of vital import—the foundation upon which it works, from mathematics to geology, from botany and chemistry to physics. Where else can we get the principles of statics and dynamics, of thrust and equilibrium, arch and buttress? Where else can we learn to know the materials that we are using? For, not knowing them, how can we hope to use them aright? Where else can we learn the principles —the despair of architects—of sound and heat and light, to apply which in actual buildings as acoustics or as ventilation is so often, even to the best of us, a source of tribulation, discredit and disaster. (Laughter and applause.)

With Literature and Classics it is obvious that Architecture goes hand in hand. Our modern architecture is as steeped in classical form and classical tradition as is the language we speak and use from day to day. Does not the exquisite harmony and proportion of Greek architecture, even in its ruins, form the truest, the most vivid illustration of that Hellenic spirit, which still profoundly rules mankind? Is not the oratory of Demosthenes brought home to us by the rhythm of the Parthenon, the music of Æschylus and Sophocles and Plato, by the beauty of Doric Propylæa or Ionic Erechtheum? Does not the might of Rome, welding the civilized world for the first time in its history into one great empire, impressing a sense of unity like a revelation, on the world, so that after centuries, right down to our own, still clung to it and strove to realize it as of old—does Rome not find its expression as truly in its architecture as in its laws? that architecture, which still maintains its hold upon us, and which twelve or thirteen centuries ago was planted by the conquering legions triumphantly from East to West, from far Palmyra to Eboracum in Northern Britain. Roman building is indelibly stamped with the imprint of the Roman character and genius ; from the Atlantic to the Euphrates, from Wroxeter in the west of England, or Lincoln in the east, to Nimes in France, or Merida in Spain, on the Tagus, the Tiber, or the Danube, in Asia as in Europe, her architecture, ruined and fragmentary, as it mostly is, still bears the most eloquent of testimony to the vigorous, pre-eminent, unifying power of Rome ; it is the grandest illustration the Latin classics could desire. (Cheers.)

If there is one subject in the Faculty of Arts that seems to appeal to all with (varying, perhaps, but) never failing force, whose educative value (it seems to me) is inexhaustible, its human interest perennial, it is the study of history. My colleague, whose occupancy of the Chair of History at this university is a cause for rejoicing to us all, (applause) will not, at least, gainsay me, when I claim that there is not a more convincing commentary on the history of the past than the architecture which that past has bequeathed us. Architecture is the most obvious, the most obtrusive of the arts ; it confronts us in our homes and in our streets ; wherever we travel in countries which inherit the precious legacy of history, the great monuments of architecture are second only in interest and importance to the great landmarks of nature herself. They are noble records of the past in stone. Wherever man has dwelt and lived worthily, he has left, heaped up in noble piles, the history of his day, the memorial of the deeds he did.

Architecture is the great "object lesson" of history. Without its eloquence of storied stone, history would be shorn of its most poetic, its most impressive and oftentimes its only witness ; it would sink to the dull prose of the half forgotten chronicler. It is, perhaps, through its buildings mainly that the past holds out in tangible form its living hand to the present. What other link have we at once so impressive and so human to bind us to our forefathers? to connect the life of to-day with the life of bygone centuries? to remind us that to-day, with its struggles and weariness, its whirl and strife, its success and its disappointment, is yet not all ; that centuries and centuries have come and gone in which men have lived and striven and struggled too, have lost and won, and have handed on the torch to the next runners in life's handicap. (Applause.) Voltaire, I think it was, but the phrase has been so often quoted that by whom first said is half forgotten—Voltaire has said : "Happy the nation that has no history." Whoever it was that said it, he spoke a most preposterous folly. It is not even a half truth, in the sense that a nation's history must register a nation's crimes. A Hottentot has scarcely a yesterday or a to-morrow. That is to be without a history, but it is not to be destitute of crime ; nor is it national happiness. And, need I remind you, the Hottentot has not evolved an architecture ; he lives on in ignoble generations, till ultimately, inevitably, and perhaps properly, snuffed out. A nation that has no history is not a nation ; and every nation that has the incomparable blessing of a history has something at least to show in the way of its national architecture. In a very special way architecture is concerned in the ennobling legacy of the past ; only through the past can we builders learn thoroughly to grasp the present and work out strenuously the future of our craft.

With an illustration or two of History in Architecture, I have done. First, let us glance at Ancient Egypt—comparatively a morsel of a country, consisting of the oozy Nile bed, and corresponding very closely with Euclid's definition of a line—length without breadth. In this narrow strip of country, long drawn out, a people not so very numerous, have contrived to write their history in architecture in characters so magnificent for scale that for sixty centuries they have been unrivalled. Only from the overpowering architecture of their tombs do we know those mighty men of old, the builders of the Pyramids. Yet their names are imperishably preserved for us in the majesty of their violated limestone shrouds. They are happy in that their architecture has kept for us their history ; a history that remains forever fresh, from the ineffacable impressiveness and grandeur of their works.

Or take, some five and twenty centuries later, their distant successors, the Kings of Thebes. Can the memory of Rameses ever pass away so long as his ruined halls at Kanak and Luxor —those mightiest of temples—remain to tell their wondrous tale? Year by year that wondrous country of the Nile yields up to modern research that wearies not the secret of its centuries so long by-gone ; will the fascination of Egypt ever grow dim? Will the romance of its history grow stale and unprofitable to us moderns? I cannot think it. But where would that history be if it was not for those incomparable monuments in which it is enshrined? Perhaps nowhere else on the face of the earth are the history of a people and its architecture so absolutely synonymous.

Let us turn to early mediæval Europe, those countries of savage

hordes slowly rising into civilization amidst the ruins of Rome's vanished might. The history of the tenth, the eleventh, the twelth and the thirteenth centuries is written for us in the monkish chronicles—which are dull reading in all conscience. But infinitely more impressive and more vivid is the history written for us by those self-same monks in stone and lime, history which it is a fascination to spell out among the crumbling ruins of their buildings, so lovely in their decay. The chronicles in great part are occupied in dwelling for edification upon the rather foolish miracles in which the patron saints indulged; it seems pitiful, and childish and infinitely wearisome to us now. But the ruined church and cloister show us what they did, these monks, who were neither fools nor children when it came to action, in the centuries when they had work to do and did it. William the Conqueror in England, to establish his throne securely, harried with incredible cruelty and fury perhaps the fairest province in his dominions. From the awful severity of that blow, so swift and pitiless and thorough, Yorkshire and the north lay prostrate, too drenched in blood and ruined to recover life. Who and what saved that desolated land and made it once more populous with thriving industry and fertile? Who drained the marshes, cleared the forests, reclaimed the land and turned the desert into gardens? The history of that great social revolution is written for us in the decaying walls of those Cistercian abbeys, once so fair, and still so fair, though well nigh swept away by the hand of time and the much more ruthless hand of man, which dot the vales of Yorkshire in numbers that surprise the modern tourist. There is no fairer page of peaceful history than this conquest for civilization by the monks of a whole district, and nowhere can that page be read in fairer lettering than in the ruins of the noble piles they raised while their strenuousness was still upon them.

In the 13th century France awoke from the despondency and blight of the English sovereignty, and under Philip Augustus and St. Louis found herself a nation, with her cities rich and flourishing. The history of that time, fraught with such consequence for Europe, is to be found in and illustrated by the civic charters and incorporations, but as reading it is dry as dust. These musty records cannot appeal to us or bring home to us in even the meagrest way that stirring time as do those glorious cathedrals, which the cities raised in generous rivalry and with such amazing zeal, those gothic buildings without equal, unapproachable, which make the North of France to this day perhaps the richest field of architectural study in the world.

If there is one spot in England endeared and sacred to all English speaking folk, one spot in which the whole history of the Anglo-Saxon race seems summed up and vivified, reaching to our very hearts and throbbing to the very fibres of our being, is it not within that hallowed building, perhaps the most beautiful church of Christendom, which Henry the Third and his successors raised to replace the older church of the last Saxon King of England, built amid the marshes of the Thames, the Benedictine Abbey Church of Westminster? For well nigh eight centuries and a half—if not for longer—the people and the sovereigns of England have worked together to make that noble church a shrine for the nation's history. I confess the great past is borne in upon me each time I linger about that nave and aisle and cloister, so wondrous in their beauty, with an almost overpowering presence. Happy—thrice happy—is the nation that has a history, and a history enshrined in such a building.

I have tried—however imperfectly—to show something of what architecture ought to aim at, something of its ideals and of the bearings of the subject in a university such as this. If it be vouchsafed to me, even in but humble measure, to impart something of the inspiration of these ideals to those whom it is my privilege to call my students, I shall assuredly feel that in dedicating such powers as I possess to McGill University, I shall not wholly be laboring in vain. (Great cheering.)

On the motion of Sir William Dawson, seconded by Prof. Bovey, a hearty vote of thanks was accorded the lecturer for his able effort.

There are few businesses that permit of greater waste in small matters, relating both to time and material, than in repairing work. A contract is often taken that, if executed in a business-like manner, would yield fair profit, but that, when actually carried out, brings almost a loss because of pure carelessness. Some workmen seem specially adapted to doing repairing work and will get over the ground in half the time of another man. Success is often brought about by carefully selecting men who show ability in some particular direction.

MARBLE IN NOVA SCOTIA.

Under this heading Mr. Geo. C. Underhill writes to our Chicago contemporary, Stone, as follows: Some thirty years ago a company was organized in Halifax to develop a marble property at Marble Mountain, Cape Breton. A better outcropping or more favorable environments could hardly be asked for. At a point on Bras D'or Lake (salt water and connected with the Atlantic Ocean) about fifteen miles from West Bay, this marble stratum crops out literally on the lake shore and is exposed several hundred feet in width, and following its course back at a right angle from the water's edge we find it for a long distance coursing vertically through a table-land perhaps two hundred feet above the water. This mesa breaks off gradually to the lake shore, making it possible to lower the marble by its own weight down to the vessels for water transportation to every coast, city and town on the Atlantic seaboard and to Europe; moreover, every large market in Canada is accessible by water direct. This marble is in good variety, white, variegated, blue, etc., and the best grades are fine, firm, and in every way desirable, while the coarser layers are A1 for building material. As might be expected, the prominently exposed points are crackled and broken, but largely by influences that obtain at the surface only, as of expansion and contraction. In a word, we have here an endless quantity, good variety and quality, cheap transportation, cheap fuel (coal at less than $2 per ton), cheap labor, and so far as Canada is concerned, a protected market; in fact, doubly so, by reason of a high import tariff and absolutely no home competition, there being no marble produced in the Dominion. I repeat, there was a company formed many years ago to work this property, and with a cash capital that should have made it prosper; but it did not. Why? Simply because the manager set out, through the means of several expensive tunnels, to reach the sound material that was not apparent at the surface, evidently not knowing why it blistered at the exposures, hence not realizing its limited extent. Just how he purposed to proceed after finding sound rock, or how perfect stone was to be reached by blasting the material into fragments in advance, is not plain. Anyhow, he not only blasted the marble but the "great expectations" of his friends as well.

Then came a long sleep for the embryo marble enterprise until in the early spring of 1894, when Mr. Geo. Hattie, a fine old Scotch gentleman, and one of the original owners, succeeded with other Halifaxians in making a second start. Again they move off with ample means and with some of the strongest men in Nova Scotia interested, among them several bank men, Prof. Fraser, who is one of the ablest men the writer has ever met, and several of the best business men of Halifax, including Roderick McDonald, the company's first president. This party has started right, beginning at the mesa's crest with channeling machines and derricks. They have gone down to measurably sound stock, and now have a mill in operation, the whole plant being under the care of Mr. D. Maclachlin, who, by the way, was one of the energetic men who aided Mr. Hattie in securing capital with which to strike the rocks of Marble Mountain once more. What the future has in store for my good friends in Nova Scotia I do not know, but this much is true—they ought to win, and while there is change in everything, I believe they will prosper, for they have the wind and the waves in their favor.

CUTTING STONE WITH WIRE ROPE.

THOSE who have indulged in deep sea fishing know how the fish line cuts deeply into the hard wood of the gunwale as it is hauled in while taut. Even an iron protection, after a time, shows the wear of the rope, which is comparatively soft. This, says an exchange, gives the clue to an invention of an Albany quarryman for cutting stone. Instead, however, of hemp, he proposes to use wire rope, and with this he will carve the marble and stone right out of its native bed. The wire is wound in strands and has a very rough surface, powerful machinery gives a strong and steady strain, and the stone, yielding to the constant wear, parts, with smooth edges. It would be easy enough to cut the blocks after they are removed from the quarry, but where the cleverness of the inventor comes in is in devising mechanism that can be applied to the stone while in the quarry. This is effected by sinking two parallel channels in the quarry to a depth of little greater than that of the lowest level of the stone to be cut. The channels may be from 20 to 100 feet, or more, apart. At the bottom of each is made a small hole to receive the foot ends of the shafts of the machine. This is the only preparation of the quarry that is necessary. The ropes, which are coiled on huge drums, are then passed around the channels, and as the drums revolve the cutting proceeds. Suitable brakes are provided for the regulation of the speed and pressure. The ordinary speed of the strand is 800 feet a minute, so that a mile length of it passes in six minutes. While the strand is moving, crushed stone or chilled shot and water can be introduced to increase the attrition. Far better, however, than either of these is a composition obtained from the tailings of a magnetic iron separator, which costs about one-tenth as much as the chilled shot. It does not leave the lines caused by the shot, and it can be used over and over again.

ITALIAN BRICKWORK.

THE late Mr. Street, a great authority upon Italian brickwork, points out in his work on "Brick and Marble Architecture" to what a great extent red brick is used with stone. Italian bricks are rather larger than ours, but not of better quality; the joints are wide, generally not less than half-an-inch. The bricks used for windows, doorways, and other ornamental features, are of finer quality and moulding.

Those who know Italian examples of brick arches and tracery are aware that the cusping of arches is of brick, set in the same radiating lines as an arch, and cut and rubbed to the outline required. He says, "In nearly all cases where brick is used for tracery, it is in the shape of plate tracery. The tympanum of the arch is filled in with a mass of brickwork, through which are pierced the arches over the several lights of the window, and these are supported on marble or stone shafts, with carved capitals instead of monials; and above these sometimes, as in the windows at St. Andrea, Mantua, are three cusped circles, sometimes only one; or else, as in the cathedral at Cremona, the plain black tympanum is relieved by the introduction of a panel of terra cotta bearing the cross on a shield, whilst round its outer circumference delicately treated, though large cusping, defines the outline of the arch." Outside the arch sometimes a red brick label 2½ inches wide is introduced. In Mantua and Asti these narrow bricks are set between rings of brick and stone voussoirs.

EARLY ENGLISH BRICKWORK.

THE Eastern Counties are remarkable for some excellent specimens of early English brickwork. Little Wenham Hall, Suffolk, built in the latter part of the 13th century, shows different sizes of bricks; these are mixed with stone and flint in parts. The bricks are of Flemish shape, though some resemble Roman bricks or tiles, and the color varies. In many examples of English brickwork flint is introduced in the form of panels, and this kind of walling is known as "flush work." Nearly every important church is of this mixture of brick, or of stone and flint. Layer Marney Hall, Essex, is a noted example of brickwork. The great gate-house of three storeys, flanked by octagonal turrets, with battlements and parapets, and window mullions, exhibit an advanced stage of brickmaking and workmanship. Respecting the size of English bricks, those of Little Wenham Hall measure 9¾ inches in length by 4¾ inches wide, and 2¼ inches thick. Those made in Edward II.'s time measure 10 and 12 inches long by 5 and 6 inches wide. The "great brick" of 1734 measured 12 inches long, 6 inches wide and 3 inches thick. Portions of Hampton Court Palace show some beautiful examples of English brickwork, although a process of washing which was recently undertaken does not increase the charm of the building.

INCREASING THE RESISTANCE TO FIRE OF WROUGHT IRON PILLARS.

THE following are the general conclusions arrived at by a commission appointed by the Hamburg Senate to examine and report upon the resistance to fire offered by wrought iron pillars used in construction: They withstand fire very imperfectly, their stability being quite destroyed at a temperature of about 600° Cent., and the advantage of filling them with concrete is so slight as to be scarcely worthy of consideration. The case is, however, far different with outer coatings of refractory or non-conducting materials, which have proved capable of protecting the metal from a dangerously high temperature during a certain space of time, and, consequently, of affording effective protection against fire. The substances which appear to have exerted the best effect are the cork composition of Herren T. Ganzweig and Hartmann, and xylotile encased in sheet iron, which substances give out inflammable gases for two hours and a half, leaving a carbonaceous residue that is not destroyed by the steam from the fire hose. A pillar thus coated only gives way after being exposed to the fire for four hours, while seventeen minutes suffice to destroy it if uncoated when similarly heated. Next to the above named substances comes the Monier concrete, laid on in a coat of 40 mm. (1½ inch) thickness, which preserves iron for nearly two years and a half, while plaster of Paris and asbestos cement only give poor results.—Journal of the Society of Arts.

PAPYROLITH FLOORS.—According to Cosmos, floors are now being put down at Chemnitz, Saxony, which are non-conductive of heat, have no joints, and do not resound under the foot. They are made of a mass of paper reduced to powder, which, when melted with water, becomes a paste like plaster of Paris, and may take the place of artificial stone, cement concrete or parquetry, being all in one piece and polished.

THE BUILDER

[THIS DEPARTMENT IS DESIGNED TO FURNISH INFORMATION SUITED TO THE REQUIREMENTS OF THE BUILDING TRADES. READERS ARE INVITED TO ASSIST IN MAKING IT AS HELPFUL AS POSSIBLE BY CONTRIBUTING OF THEIR EXPERIENCE, AND BY ASKING FOR PARTICULAR INFORMATION WHICH THEY MAY AT ANY TIME REQUIRE.]

A Few Handy Rules.

IN estimating material for a building, it often happens that no convenient means are at hand, whereby the length of rafters may be found without going through the clumsy rules of square root. In the first place, a thorough understanding of what is meant by "pitch" is necessary. The word, as used by builders, means the height of the roof above the wall plates; thus, a building 24 feet wide, having its roof ridge raised 6 feet above the wall plates, is said to be quarter pitch; if the ridge is 12 feet above the level of the wall plates, then it is said to be half pitch, etc., etc. By the accompanying rule we can get the lengths of the rafters for any of the pitches herewith named, for estimating purposes, by simply multiplying the width of the building by the corresponding decimals for the difference in pitch, which gives the length of the rafters in feet, and a decimal of a foot; multiplying this decimal by 12, we have the inches. This method, of course, is only intended to be used in figuring up the quantity of materials required; it does not give angles or cuts; these, along with the exact lengths, are better found by using the steel square, in a manner that we will describe in a subsequent issue:

RULE.

For	1/4	pitch, multiply	width	of	building	by	.56
"	1/3	"	"	"	"		.6
"	5-12	"	"	"	"		.65
"	1/2	"	"	"	"		.71
"	5/8	"	"	"	"		.8
"	3/4	"	"	"	"		.9

As an example, let us suppose a building 26 ft. wide, the roof to be one-half pitch, as per rule. We proceed as follows:

Width of building, 26 feet.
Multiple for half pitch, as per rule, .71

26
182

Total, 18.46
If we multiply the decimal by 12

we get 92
46

We have in inches, 5.52

or a total length of rafter of 18 feet 5.52 inches, or for estimating purposes, 18 feet 6 inches. Now this is an odd length, and would be difficult to find in any lumber yard in Canada or the United States, and to take the next regular commercial length of 20 feet, would mean a great waste of material, unless the length would be called for as lookouts over the eave, but, if 18 feet 6 inches should represent the exact length, the estimator would be justified in lowering the roof a trifle so that stuff 18 feet long would answer the purpose, and we are sure no reasonable architect would object, unless there were greater reasons than usual for the ridge standing that particular height.

Cisterns.

THERE is no more useful convenience to a village or country house than a good cistern, and the carpenter or bricklayer is frequently called upon to devise or construct one of these important affairs. It matters not whether a cistern is formed by simply digging a hole in the ground, without further backing, or is lined up with stones or bricks, it should be plastered with good cement, and the bricks and stones should also be laid in cement, as it makes much better work. If the ground is of a kind that will admit of plastering on, a good coat of cement may be all that is required to make it water-tight. Sand and gravel thus cemented stand fairly well, but it is better when a trifling extra expense is no object, to have the bottom and sides of the cistern lined up with either stones or good hard bricks. Clinkers are the best for cistern building, as they do not soften and crumble on the outside. Stone does very well for lining, but being heavier than bricks and irregular in size, it does not generally break joints very well, and is apt to settle and crack the cement; and being rough and uneven on the face, requires more cement to cover it, than would the same surface if made of bricks. When the latter can be obtained at from $7 to $8 per thousand, of the proper hardness, it is more economical to use them than to make use of the cheapest kind of stone-work. Usually the lining of cisterns with bricks is done by making them all "stretchers," which makes the wall four inches thick only. We think a much better job is secured by using "headers" for every fifth course; it makes the wall so much stronger and better. The bottom should be laid with bricks on edge, and should be "pot-bottomed," or lower in the centre than at the circumference. The mortar used for plastering should be formed of one part of cement and two of sand, if the cement is extra quality of the Owen Sound brand, or one of cement and one of sand if of inferior grade. Good sharp sand should be used in any case. Two coats are generally applied, and sometimes three, waiting for each coat to partially set before applying the next. The last coat should be brushed down with a wet brush while it is green, which materially assists in hardening the cement. Every cistern should be provided with an overflow water pipe, leading to some point where the surplus water may get away without inconveniencing anything. This pipe may be fixed near the top of the cistern on a level

where the water will rise to when the cistern is sufficiently full. It is also desirable to have a filter attached, in order that the water may be used for culinary purposes if desired. Filters may be attached in different ways : They are sometimes fixed at the top where the the water is let in, and sometimes they consist of partition walls, which divide the cisterns in two compartments, the water being let into one compartment and taken out of the other, holes being left at the bottom for the water to pass through the partition. Gravel, sand and charcoal, or marble chippings and charcoal, are employed to form the filter. These are filled in in layers, to a height above the holes in the partition on the side in which the water is admitted. The partition should be plastered just the same as the walls of the cistern. Sometimes a single brick partition is left between the two compartments without cement on either side, and without holes at the bottom, but the joints must be laid in cement. The water is then left to percolate through the bricks as best it may. For a time this makes a splendid filter, but after a while the pores get filled up and as a filter it becomes comparatively useless. Another filter may be made by forming a small arched mound of brickwork about a foot high on the bottom of the cistern at the lowest part. The pump-pipe is cemented into the top of the hollow mound, and small holes are left around the bottom for the water to pass through. A circular brick wall is built around the mound, about three or four inches from it and about three or four courses high, and the space between the circular wall and the mound is filled with the filtering materials, which are put in in layers. The first and last layers should be clean gravel, marble chips or spalls of other stones. The second layer of charcoal should be powdered and packed in solid. The whole of the cistern should be plastered before the filtering materials are put in place. When repairing a cistern when the cement is cracked, the cement should be cut away two or three inches from the defect, and the wall should be well wetted before the new cement is applied. The usual form of cisterns is cylindrical, and we annex a table giving contents of cisterns having that form, and of various dimensions. Cisterns having arched tops or scooped bottoms, one-third of the height of such arch or scoop should be added. The table is nearly correct and is easily understood, and will prove useful in preparing estimates for cisterns. For every foot in depth a cistern will contain :

If 3	feet in diameter	....	55¼	gallons.
" 3½	"	"	75	"
" 4	"	"	98	"
" 4½	"	"	124¼	"
" 5	"	"	153¼	"
" 5½	"	"	185½	"
" 6	"	"	220¾	"
" 7	"	"	300½	"
" 8	"	"	392½	"
" 9	"	"	497	"
" 10	"	"	613½	"

One gallon is required by law to contain eight pounds of pure water. To get nearly the exact contents of a cistern from the foregoing table, multiply the figure opposite the diameter by the depth in feet, and you have the number of gallons the cistern will hold, nearly. For example, take a cistern four feet diameter and six feet deep, then we have : $4 \times 98 = 392$ gallons ; that is, a cistern four feet in diameter and six feet deep, will hold 392 gallons, nearly.

Warm Floors. One of the reasons why floors in frame buildings are cold, is because, when joists are placed in position, the spaces between them at the walls are left without anything to prevent cold from the outer skin of the wall from getting at will between the ceiling and the floors. In all cases, the spaces between the joists or the walls should be lathed, and a strong coat of well haired mortar applied before the ceilings are lathed. This precaution would make a house 15 or 20 per cent. warmer than where it is neglected. In lower floors this method of dealing with the spaces, or some similar one, should never be overlooked or cold feet will be the rule with those who are obliged to remain over them for any length of time in the winter. A good way to avoid cold in a lower floor if the joists rest on a stone foundation, is to "brick-fill" between joists to a level with the floors, making the "brick-filling" not less than four inches thick, having the bricks laid in good mortar and well "flushed" up to the joists and made level with the top of the timbers. In brick or stone buildings, "brick-filling" is generally done on the lower floor, but often in the upper stories where the walls are left thinner by set-backs, the joists rest on the steps formed by the set-back, and in many cases nothing is done to the wall between the joists, and the ceiling and floors are finished with nothing to prevent the cold penetrating through the thin walls to the spaces between the lath and the floor. Sometimes a careful workman will see that the brick walls between the joists are rendered with a heavy coat of mortar, which is very good in its way, and would be better if the furring ran down to the ledge or step, and the space lathed and plastered, but this is perhaps objectionable because of its forming places where mice or other vermin would find resting places. The better way is to brick-fill, leaving a hollow space between the wall and the filling, and rendering the filling on the room-side. If the projection of brickwork receiving the joists is not more than four inches, the brick-filling may overhang the walls an inch or so on the inside, so as to give a one-inch hollow space between the wall and the filling. As this projection would be between the joists it would be hidden from sight.

Steam Heating. Of late years there have been introduced into Canadian homes a variety of heaters, including hot air, hot water, combinations of hot air and hot water, and steam heating pure and simple. In fact, there is scarcely a village, hamlet, or "corner" in the whole country that cannot boast of a "heater" of some kind, and each kind has got its own friends and admirers, all of which is right, for when a man is satisfied with anything he possesses, we take it that it would be almost sinful to unseat his satisfaction. In speaking of heaters, we do not mean stoves, nor yet fireplaces, but of some central arrangement from which heat may be projected to rooms some distance from the one containing the apparatus in which the heat is generated. Of such is the steam heater, and while this may not be the best for ordinary dwelling houses, it has become so well understood, and during the past few years has made such a rapid advance in public favor, that it seems almost unnecessary to describe its superiority over other modes of heating for large buildings, such as stores, hotels, or other buildings of more than ordinary dimensions. While it has not

yet been decided beyond a peradventure what mode of heating is the most economical, it has become a fixed fact in the minds of many who have investigated the various methods, that steam heating, if the appliances are modern and fitted up with modern attachments, is by far the easiest to handle, and the desired results are more direct and rapid than the like results of any other method. Notwithstanding the fact that heating by steam is the proper thing to introduce into large buildings, we do not approve of it for use in private dwellings or cottages, unless, of course, the buildings are large and contain a great many rooms and halls. For the smaller buildings a hot water system is by far the best, and country builders, when asked by their employers—as they often are—what system of heating is best to adopt for warming the building they are about to erect, should advise accordingly. If the building is of moderate size and does not contain more than 16 or 20 rooms, including halls, advise hot water. If there are more than twenty and the rooms are large, then advise steam by all means. Of course, there will be other things to consider. A hot water furnace must have a place under the main floor in order that the cooled water may return to the boiler by gravitation ; so also must a steam heater, for it must be remembered that the water level in the boiler must be below the lowest point of the lowest radiator. As a rule, it costs a little more to put in a hot water system than to put in steam, but when once in, and in good working order, and properly protected, it is the best device in existence for warming Canadian homes of moderate dimensions. In small houses, where the expense of a hot water system would be too great, a hot air or combination furnace will be found to be a great improvement over stoves.

PRODUCTION OF BUILDING MATERIALS.

THE fifth annual report of Mr. Archibald Blue, Director of the Ontario Bureau of Mines, which covers the year 1895, furnishes some interesting, although not altogether encouraging statistics relative to the production of building materials within the last five years. The depression in building according to the statistics, seems not to have affected the production of materials until last year, when in nearly every line there was a marked decrease in the quantity manufactured. This is accounted for, no doubt, by the fact that much of the products of the former years remained unutilized, and manufacturers were averse to accumulating further supplies. The following table gives the value of building stone, rubble and other products of the quarry for the five years, together with the amount of wages paid for labor ; and shows a steady decline since 1891. For each of the last two years the value is only about one-half of the value for that year :

Year.	Value.	Wages.
1891........	$1,000,000	$520,000
1892........	880,000	730,000
1893........	721,000	464,000
1894........	554,370	336,000
1895........	438,000	296,000

The production of common brick was greater in 1892 than in the previous year, but since that time has become less each year. The returns indicate that many of the brick yards have not been in operation. The quantity of drain tile manufactured increased from 7,500,000 in 1891 to 25,000,000 in 1894, but dropped to 14,000,000 in 1895, which amount, however, was nearly double the output of 1891. Great quantities of tile are now being used by farmers in an effort to improve their farms and to meet the competition so keenly felt. The production of common brick and tile from 1891 to 1895 was as follows :

Year.	Brick No. of M.	Value.	Tile No. of M.	Value.	Wages.
		$		$	$
1891........	160,000	950,000	7,500	90,000	432,000
1892........	175,000	980,000	10,000	100,000	445,000
1893........	162,350	932,500	17,300	190,000	451,000
1894........	131,500	690,000	25,000	280,000	388,000
1895........	126,245	705,000	14,330	157,000	364,000

With respect to pressed brick, roofing tile and terra cotta, the largest production was in the year 1894, when it amounted in value to $286,230. For the past four years the quantity shows no great variation, and would seem to indicate two facts, viz., that pressed brick is meeting with more general favor, and that the United States product is likely to be entirely shut out of the Canadian market. The first pressed brick was made in Ontario eight or ten years ago. Below are the statistics for pressed brick, roofing tile, and terra cotta:

	1895.	1894.	1893.	1892.	1891.
Number	17,940,867	25,456,000	21,634,000	22,048,000	13,617,909
Value ..	$ 184,550	$ 286,230	$ 217,373	$ 259,335	$ 156,699
Wages..	69,442	95,400	80,686	88,865	58,000

The returns relating to lime show that the production for the past five years has not varied greatly. The figures are :

Year.	Bushels.	Value.	Wages.
1891	2,350,000	$ 300,000	$ 116,000
1892	2,600,000	350,000	120,000
1893	2,700,000	364,000	122,500
1894	2,150,000	280,000	108,000
1895	2,090,000	280,000	104,000

Greater development has taken place in the cement industry than in any other line connected with the building materials, yet the quantity of Portland manufactured is less than one-half that which is imported. The production of natural cement, as the accompanying table shows, has remained nearly stationary since 1891, but the quantity of Portland has been nearly doubled. The demand for that variety for street construction, as well as for Government works, has no doubt encouraged this industry at home.

	Natural Rock Cement.		Portland Cement.	
	1895.	1894.	1895.	1894.
Number of works....	5	5	2	3
Number of workmen.	45	63	129	105
Wages for labor.....	$14,166	$13,020	$46,000	$31,858
Product, bbl	55,219	55,323	58,699	30,580
Value	$45,145	$48,774	$114,332	$61,060

The following table shows the quantity and value of Portland cement imported for home consumption for the

nine fiscal years ending June, 1895, and does not include any importations for Government use :

Year.	Barrels.	Value.
1886-7	102,450	$148,054
1887-8	122,402	177,158
1888 9	122,273	179,406
1889-90	192,332	313,572
1890-1	183,728	304,648
1891-2	187,233	281,553
1892-3	229,492	316,179
1893-4	234,231	284,964
1895-5	196,281	242,813

PLUMBERS' ASSOCIATIONS.

THE Toronto Association of Master Plumbers is doing effectual work under the direction of the enthusiastic president, Mr. W. J. Burroughes. Their meetings are now held in Pythian Hall, corner Queen and Victoria streets. Mr. Burroughes has drawn up a draft of an act providing for compulsory examination of plumbers in Ontario. This act, in its present form, is entitled "An Act to Secure the Registration of Plumbers and the Supervising of Plumbing and Drainage in the Cities of the Province of Ontario." It will be submitted for approval to the different associations throughout the province and the Secretary of the Provincial Board of Health before being presented to Parliament. As the act is claimed to be in the interest of the public, Mr. Burroughes hopes to meet with little opposition in the House.

The London Association is one of the most active branches of the Dominion Master Plumbers' Association. We are informed that the membership embraces every legitimate plumber in the city, as well as a number of others located in adjacent towns. The weekly meetings are well attended, and much interest is shown in the proceedings thereof. The president, Mr. Wm. Smith, is unceasing in his efforts to promote the success of the association.

In striking contrast with the London Association is the Hamilton branch, which has not held a meeting since July. While recognizing the benefits to be derived from an interchange of ideas as thus afforded, there is an apparent lack of energy on the part of many of the members. It is hoped that during the winter season new life will be infused into the master plumbers of Hamilton.

The plumbers and steamfitters of Great Britain have formed a national association, with a membership of 800.

ASPHALT FELTING.—In order to keep the dampness out of walls and prevent its rising from the soil, Buscher and Hoffman, of Eberswalde, apply strips of asphalt felting, as wide as the wall, in lengths of about 3 feet. The pieces overlap by a couple of inches ; the pressure of the continuation of the wall, resting on this layer, secures a perfect joint. The manipulation is very simple and easier than the application of liquid asphalt, which in warm weather is not rarely squeezed out again. The insulation is not destroyed when parts of a building settle. The felting has profitably been applied in tunnels and underground structures, and has answered well in the Carlsruhe tunnel, for instance. Old buildings can also be fitted with the felting, which bears a fairly high temperature.

CORRESPONDENCE.

[Letters are invited for this department on subjects relating to the building interests. To secure insertion, all communications must be accompanied by the name and address of the author, not necessarily for publication. The publisher will not assume responsibility for the opinions of correspondents.]

HANGING INSIDE BLINDS.

Editor CANADIAN ARCHITECT AND BUILDER.

WILL you, or some of your well informed readers, kindly inform me through your columns as to the best and most economical method of arranging for and hanging two-fold inside blinds. The building in which the blinds are to be hung will be of brick, fourteen inch wall, furred and lathed and plastered on the inside. The windows are 3′ 6″ wide, sashes 1 3/4″ thick, double hung, and there are to be heavy inside stools. The blinds are to be of black birch, and not more than 7/8 of an inch thick, and are to fold back in a box and show as panels on the side of the window when so folded ; casings are molded and are six inches wide and will show square in the room. I desire to make a nice job of this work, but do not want it to cost too much. Any information through your columns will be appreciated by a

YOUNG CARPENTER IN DISTRESS.

Owen Sound, Nov. 10, 1896.

[In reply to the foregoing, we may say to a "Carpenter in Distress" that there are many ways of preparing "boxing for shutters" practised in England and in this country more or less costly, and we believe there are among our readers many expert workmen who can give intelligent descriptions of how the work may be done with efficiency and economy, and we submit the problem to them with the hope that they will relieve "A Young Carpenter" of his difficulty.—THE EDITOR.]

INFORMATION REQUIRED BY BUILDERS.

SIR,—I have read with pleasure the article in your journal, "Loads and Strength of Roofs." This led me to think of the advantages the builders would get if they had a card giving the weight of the different kinds of roofing material, flooring, stud partition, outside walls, etc., etc., so as to enable the builder to know at a glance the strength required for the rafters, joists, beams, etc., also the exact weight they will have to support. I have many books with those tables and formulas in them, but as they are in most cases worked with letters, I have great trouble to get at an approximate idea of the weight to be supported and the size of joints and rafters required. If you had something with examples in plain figures, then the great majority of the builders would know what to buy, and have no fears for the safety of the building that they are repairing or constructing. I enclose stamp for reply, and oblige.

Your Obedient Servant,

J. B. D.

Montreal, Nov. 5th, 1896.

[The information asked for by our correspondent is not easily obtainable, and will require considerable research and time to put in shape. We shall make an effort to supply at least a portion of it, however, through this department in the near future.—THE EDITOR.

Besides indigo and purple few colors were employed by the ancients, and these were obtained for the most part from the vegetable kingdom, but their purity was so great that they have kept well to our own times, after having undergone for centuries the action of the air and the sun.

LEAD VS. IRON FOR SUPPLY AND VENT PIPES, FROM A PLUMBER'S POINT OF VIEW.*

If we consider the question as an engineer would when seeking the most suitable material for his purpose, and divest our minds of all prejudice and consideration of how it will effect our individual interest as plumbers, or the business in general, we will sooner arrive at correct conclusions. If it is truth we are seeking, and not specious argument to bolster preconceived notions, we certainly do so.

In past times lead was used by plumbers almost exclusively for water pipes and other purposes. It was the chief material a plumber was called on to use, and it was necessary for him to be most skilled in working to be a success in his business. It was almost considered the only metal fit for that purpose.

Now we find it practicable to fit up the largest buildings in the most desirable manner, with the finest open work, and not use an ounce of lead pipe. The tendency of the demand at the present time is for substitution of other metals in preference to lead in the plumbing business. This tendency is the verdict of public opinion that condemns lead, and relegates it from the position of primary importance to a secondary one in the plumbing business. We may grieve at this tendency, but it is useless for us to kick against the progress of the times. It is better that we adapt ourselves to the situation, keep in line with all improvements, and not attempt to impede them because they necessarily dispense with the skill we have acquired.

Lead pipe (which was sometimes tinned inside) was formerly considered the most suitable for the conveyance of water from the mains to all vessels used for domestic purposes. It certainly answered the purpose well. The charge of lead poisoning was sometimes laid to the use of these pipes, but few cases were ever proved. The percentage of people using this pipe suspected of suffering from lead poisoning was so small as to be of little importance.

To the Pacific coast iron pipe came with the early gold seekers, and was probably used by them as water pipe, because it required less skill to join and lay it. Black iron pipe was soon found to be useless on account of rusting, but galvanized iron pipe answered better, and was first introduced in small houses for conveying cold water only, and was not considered suitable for hot water at all. As experience showed no objectionable feature in this material, it began to be used in better houses, but for many years iron was used for cold and lead for hot water. Gradually the use of galvanized iron pipe extended for hot water, until now it is almost the only kind used. Forty years' use on this coast has demonstrated that for supply pipes galvanized pipe is well adapted. The zinc coating has proved a thorough protection which makes it very durable.

In comparing the several advantages that lead and galvanized iron pipe have when used for water supply, we find that, galvanized pipe being harder, it is less liable to be damaged by accident, as it is able to resist such accidents as nails being driven against it and the gnawing of rats.

Being stronger it requires less support and is never found hanging in festoons. It is seldom broken with fair usage, when once covered up in good condition. It seldom requires any repairs, except when it is burst with frost. It is not injuriously affected by rapid changes of the temperature of the water it carries in any degree above the freezing point, as is lead pipe if allowed room for expansion.

The cost of galvanized iron pipe and the labor needed for its use are less than for lead pipe. With the introduction of nickel-plated supply pipes for connections of open work, there disappears the last obvious advantage of lead for supply pipe. Lead pipes are often taken out of houses, to be replaced by galvanized iron pipes, but never the reverse on this coast.

If this be the result of the experiment of using galvanized iron pipe for supply pipe in a new and venturous section of the country, it only indicates what will be the result in older and more conservative sections of the country. We find plumbers in eastern cities getting alarmed at the increased use of galvanized iron for supply pipe, and claiming in the trade papers that it becomes worthless in three or four years; that it rusts at the ends and at other exposed places, and is generally no good. Forty years' extensive experience with the use of it on the Pacific Coast demonstrates that such is not the case. The continued growth of its use from a modest introduction of it as a cheap and convenient substitute to its present position, when it has driven lead supply pipe entirely out of use, and that too in face of the hostility of the men who had to work it, proves that it must have merits of no small degree.

When used as waste pipes iron pipes do not have the same advantages they have as supply pipes. Wrought iron pipe unprotected by covering is not suitable for vent pipe, and should be discarded for the reason that it rusts quickly internally, which rust soon begins to fall from the vertical portions and closes the bottom of the pipe. Galvanized iron pipe is better, but it will not withstand the action of sewage or sewer gases, and therefore is not reliable.

Iron pipe dipped in asphaltum and thus protected has no known weakness, and the great success of the adopting of iron dipped pipe for soil pipe would justify us in expecting equally good results from the general adoption of such pipe for sewer ventilation.

Lead pipe for ventilation has many advantages to recommend it if properly supported and protected. Lead pipe is capable of resisting all chemical action of sewage or gases, and, not being exposed to great changes of temperature, there is little danger of breaking by contraction and expansion, as is sometimes the case with waste pipes which convey hot water. The smoothness of the interior of lead pipe and its gentle curves make it most efficient and desirable on account of the small friction which it offers.

* A paper by William Eccles, of Portland, Oregon, in the Gas Light Journal.

REQUIREMENTS OF GOOD HOUSE PLUMBING.

A paper entitled "Improved Methods of House Drainage," read before the Architectural League of New York, by Mr. Paul Gerhard, C. E., Consulting Engineer for Sanitary Works, contains the following on the subject of good house plumbing:—

The limits of this paper do not permit my discussing in detail the requirements of water closets, and I must pass on to review briefly the other plumbing appliances of houses.

Speaking of wash basins, we may distinguish four principal types, viz: 1, tip-up basins; 2, chain and plug

basins; 3, open stand-pipe overflow basins; and 4, secret waste-valve basins.

Tip-up basins are generally condemned, because in their usual form they have objectionable features. If the receiver could only be arranged so that it would not become foul, or that it was readily accessible for cleaning, this type of basin would have many merits. It is, without doubt, very convenient in use, has no concealed overflow, no chain and plug, is rapidly emptied and flushes its waste pipe and trap well at each discharge.

The objections to the second type, the common chain and plug basin, are too well-known to need further comment. It is proper, however, to state that there has recently been put upon the market some modified forms of this type, which I consider great improvements upon the ordinary type. One is a siphon-basin, which empties rapidly and flushes its overflow at each discharge. The overflow channel is so shaped that when the plug is inserted in the bottom of the bowl and the same filled with water, the overflow is trapped. In office-buildings and in hotels, where a stand-pipe overflow basin or a bowl with waste-valve is too expensive and too complicated for general use, the siphon form of basin has much to recommend it. The other improved form is a chain-and-plug bowl in which the waste outlet has been greatly enlarged, and which has the usually hidden overflow channel made much shorter and accessible by means of a removable strainer.

The third type of basin has an open stand-pipe overflow, and there are numerous modifications of the device for raising the standpipe. From a sanitary point of view, this type has, undoubtedly, the greatest merit of all forms, still my experience has been that the general public is hardly sufficiently educated in sanitary matters to appreciate its merits. By many this form of basin is utterly condemned on account of its odd shape and appearance. The favorite form of basin is just the one which has the most objections from the hygienic standpoint, namely, the bowl with secret waste valve. To discuss its objectionable features in detail would lead us too far.

Regarding that valuable fixture for personal cleanliness, the tub or bath-tub with its various modified forms, such as the foot-tub, the sitz-bath, the hip-bath, the bidet, etc., I would state that tubs of wood lined with copper are less used than formerly in private houses, probably because they always require some sort of wooden casing, and also because they lose their bright appearance in use. Enamelled iron tubes, standing free from the wall and raised from the floor, constitute a satisfactory sanitary fixture, which is only surpassed by the beautiful all porcelain bath-tubs. Both kinds of tubs are now obtainable with a glazed roll rim, thus doing away entirely with all woodwork. I ought, perhaps, to mention in this connection, that a great improvement in the manufacture of American earthenware has recently taken place, and that it is now for the first time possible to obtain porcelain bath tubs made in this country. In regard to the appliances used for holding water in the bath tub, and for emptying the same, much of what I said of wash basins applies here. In this matter I may appear to you old fashioned, when I state that my decided preference is for an open stand-pipe overflow.

For baths in public institutions, for baths in factories, and for people's baths, there is a growing tendency to discard the tub bath in favor of the rain or spray bath, which is greatly superior from a sanitary point of view, besides having many economical advantages.

Slop sinks and housemaids' sinks are obtainable in a variety of serviceable forms, most of them excellent from the sanitarian's point of view. I would only remark that a flushing cistern is quite as essential in the case of a slop sink as in that of water closets. An ingenious and novel arrangement consists in a slop sink, which flushes itself automatically each time slops are emptied into it.

Kitchen sinks are likewise obtainable in a variety of materials. This fixture is much improved by changing the dribbling stream passing through its waste into a quick and effective flush. Attempts in this direction have been made with some success, and the devices employed are certainly worth considering. Incidentally, the question of avoiding the kitchen grease nuisance is thereby solved, in a better way, to my mind, than by the employment of grease traps at the sinks, which invariably constitute a nuisance, are usually forgotten or neglected and are not to be recommended. I must content myself with a mere allusion to the subject.

Of urinals, it is only necessary to mention that in private houses their use is not to be encouraged, as the fixture is very difficult to keep clean. In offices and in public buildings, such as hotels, railroad stations, court houses, etc., the fixture is a necessity, and great attention is required not only in the fitting up, but in its maintenance. The projecting lip of porcelain urinals seems to me to be of doubtful advantage. One point in the fitting up of the fixture is worthy of mention: The bowls are generally set up too high from the floor slab. I find it is better to set them at a height not exceeding twenty-two inches from top of lip to floor line, instead of twenty-four to twenty-six inches, as is customary. The floor-slab is thereby kept more readily free from drippings.

In fitting up plumbing fixtures, the chief aim should always be the avoidance of woodwork at and around them. All fixtures should stand free from the walls and be accessible on all sides. Even the seats of water-closets are now attached directly to the bowl, the closet thus stands absolutely free and detached from the wall, and the entire fixture can be reached for cleaning and for repairs. In one respect, however, modern plumbing fixtures are open to considerable improvement: I refer to the undesirable noisiness accompanying the flush and the discharge of the fixtures. This problem, as experience teaches, is not easily solved.

The time at my disposal permits only a brief allusion to the testing of plumbing work. All work should be tested before acceptance, as knowledge of the safety of the plumbing work can only be obtained in this way. I regret to say that I have found only very few mechanics doing plumbing who apply to their work any test, except where this is specially insisted upon by the architect or engineer. To my mind, it is one of the most important duties which architects owe to their clients, to see to it that all work is tested. For new work we have the water test and the air pressure test. This should include not merely the main horizontal lines and the vertical stacks, but likewise all the branches, and the brass ferrule joints. The finished work should be tested by the peppermint or by the smoke test, which help to show imperfections in the joints of nickel-plated piping and at the floor joints. In the inspection of old

work, the water test, which is the best test, cannot, for obvious reasons, be applied, and here the smoke test, or the test with oil of peppermint, intelligently applied, give indications as to the condition of the work.

A great step forward would be made and plumbing work vastly simplified, by abolishing, or at least modifying the trap vent system.

There are at present two quite different methods of arranging the system of trapping the fixtures in a building. In the one system, which is in accordance with the majority of plumbing regulations, and is the one at present enforced in New York City, all traps must be back aired or vented. We thus obtain a duplicate system of pipe lines, the work is complicated, more expensive and may become more unsafe, on account of the greater number of pipe joints and the possibility of "by passes." The other system—the one pipe system, as we may call it—is distinguished by its greater simplicity, economy and, as I maintain, by its greater safety. This method substitutes non-siphoning traps or anti-siphon trap attachments for the cumbersome method of back airing. In this system, all main soil and waste lines must be quite as fully ventilated by extending them the full size up to the roof as in the usual method. All fixtures are located directly at the lines carried up to the roof, or within a very few feet of the same. Siphonage of the traps is impossible under the ordinary conditions, quite as much so as in the back airing system. You will find the majority of plumbers opposed to the new system: for while it simplifies the work, it reduces the amount of piping used and thereby the cost of the work. There is also much prejudice against the proposition, many plumbers seeming to fear that by putting themselves openly on record as in favor of it, they would by others be considered as not quite up to date in plumbing matters. The fact remains undisputed—and I have demonstrated it in many cases in my practice—that the new method is, at least, quite as safe as the old one. I venture to predict that in a very few years plumbing laws will be so modified as to leave it optional with the owner or architect of a building which method he will adopt.

This leads me to say a few words in regard to plumbing rules and regulations, in particular of those in force in New York City. Further advancement in plumbing requires the revision and improvement of the plumbing by-laws of the building department. Far be it from me to underrate the good which the present rules have accomplished in the past. Ours is not, however, an age in which we can at any time afford to stand still. Constant progress is made in every department of construction and the researches of the practical sciences are everywhere utilized and embodied in actual practice. Let us hope to see soon a revision of our plumbing laws. Be it largely copied by other cities. We cannot afford to fall behind in this matter. Our present rules are too indefinite in many details; they are much too arbitrary in others. Take, for instance, the question of sizes of drain pipes, of soil pipes, of vent pipes, the diameter of traps, etc. There is certainly now sufficient practical experience available to lay down more definite rules as to sizes. The rules should also in the future prohibit fixtures which sanitary science has long ago recognized as being absolutely bad. Pan closets, wooden sinks and wooden wash tubs should be discarded, and privy sinks should no longer be tolerated.

MANUFACTURES AND MATERIALS

BRICKS FOR WELL LININGS.

OF patent bricks there are no end, but we know of none that fully satisfy all the requirements of the well-sinker, says the British Clay Worker. Our readers will probably say that our view, in that case, must be very limited—they could tell us of plenty of bricks that answer the purpose very well indeed. But we shall convince them to the contrary, and we throw out this suggestion with every confidence. Patent cement blocks have been much employed in recent years for well lining; they are made on the interlocking system. But whether it be cement blocks or bricks, the effective locking too often takes place horizontally only. It seems to be forgotten that there is considerable pressure from behind, and bulging inwards too often results. That is a fault, however, that can easily be remedied, and we are not so much concerned with that at the moment as with the manufacture of a type of brick that will permit the well sinker to gradually decrease the diameter of the well with the usual ledges and steps. With a deep well it is customary to sink to a considerable depth of a certain diameter, say 6 feet to commence with; then the diameter is decreased to say 4 feet 6 inches. It is at the point of alteration of the diameter (which alteration may be allowed three or four times in a very deep well) that the weakness results, and it is there that we would advise the use of a different type of brick to any at present employed, to our knowledge. The change from 6 feet to 4 feet 6 inches ought not to be sudden, but gradual; interlocking bricks should always be used except where the strata bored into are of a very dry character, and no difficulties result from pressure of superincumbent weights. And these bricks should be made by proportionately decreasing from the one diameter to the other. The bevelling off at present creates a spot for the lodgement of any sediment, any weeping and leakage too frequently takes place at such points. This would no longer be the case were suitable non-porous bricks of an interlocking decreasing diameter type employed at such junctures.

Some beautiful specimens of stone have recently been taken out from the vicinity of Lake Manitoba.

Mr. G. C. Morrison, of Hamilton, has invented a seamless tube hot water boiler for domestic heating purposes.

It is reported that a company has been formed in Toronto to manufacture bricks on an extensive scale at Rossland, B. C.

The Richmond Times states that the asbestos mines near Danville, Que., have been sold to a joint stock company for $2,500,000, the deal having been completed in England between Mr. Boas and an English syndicate.

Mr. C. Sontum, commercial agent for Canada at Christiania, Norway, has just sent to the Department of Trade and Commerce a letter in which he speaks of a successful shipment of steam radiators from Toronto. He emphasizes the importance of manufacturers branding their goods with the name "Canadian," or "Manufactured in Canada."

The slate industry of New Rockland, Que., is being pushed with the usual vigor, a valuable new bench of slates being reported from the eastern side of the quarry, so that the work will be extended at the surface instead of sinking to a greater depth. The slate quarry and works at Danville, Que., are at present closed pending the disposal of a large quantity of merchantable material on hand.

A new material has been discovered for insulating pipes, which is made of silex, which, when ground into fine particles, is to be used to surround the conductor wire with, inside an iron pipe, which should be packed down. It is claimed that the silex will not burn, or melt, or rot, or leak; it is said to absolutely prevent electricity coming into contact with any other substance inside a building where it is used.

According to the annual report of the Ontario Bureau of Mines, the production of Portland cement in Ontario in 1895 was 58,699 barrels, as against 30,580 barrels in 1894. The value was $114,332, as against $61,060, and the wages paid were $46,000, as against $31,858. It is noticeable, however, that this is but a small proportion of the total used, the entries of Portland cement for home consumption for the fiscal year 1894-95, exclusive of that imported for Dominion government use, being 196,281 barrels, valued at $242,813.